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COMPUTERS IN THE FEDERAL GOVERNMENT: A COMPILATION OF STATISTICS-1978

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U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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COMPUTER SCIENCE & TECHNOLOGY:

Computers in the Federal Government: A Compilation of Statistics – 1978

Martha Mulford Gray

Institute for Computer Sciences and Technology
National Bureau of Standards
Washington, D.C. 20234

U.S. DEPARTMENT OF COMMERCE, Juanita M. Kreps, Secretary

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The National Bureau of Standards has a special responsibility within the Federal Government for computer science and technology activities. The programs of the NBS Institute for Computer Sciences and Technology are designed to provide ADP standards, guidelines, and technical advisory services to improve the effectiveness of computer utilization in the Federal sector, and to perform appropriate research and development efforts as foundation for such activities and programs. This publication series will report these NBS efforts to the Federal computer community as well as to interested specialists in the academic and private sectors. Those wishing to receive notices of publications in this series should complete and return the form at the end of this publication.

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COMPUTERS IN THE FEDERAL GOVERNMENT: A COMPILATION OF STATISTICS - 1978

ABSTRACT

This report presents data on the status of computer technology in the Federal Government. It is an extension and update of "Computers in the Federal Government: A Compilation of Statistics" (NBS SP-500-7), June 1977. The report contains a combination of existing statistics from Federal Government and computer industry sources and original statistics based on these sources. Data is included on numbers of computers installed in the Federal Government, dollar value of computers installed, numbers of computers installed by agency, Federal ADP costs by agency, Federal computers by acquisition date, and Federal ADP work-years. A detailed analysis is presented for Federal computers classifying the computers into three major categories, general purpose computers, special computers and minicomputers. Federal computers are compared with U.S. computers in the same categories.

KEY WORDS: Federal Government Computers; Statistics; ADP Costs; Federal Minicomputers; Federal ADP Statistics; Federal acquisition dates; Federal ADP work-years

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Summary of Findings

- As of year-end 1977 there were over 11,000 computers in the Federal Government and over 325,000 computers in the United States.
- The dollar value of the computer systems in the Federal Government was $4.45 Billion in FY77.

  The dollar value of the computer systems in the U.S. was approximately $49.7 Billion as of year-end 1977.
- Over the last eight fiscal years the number of Federal computers has increased over 11 percent annually while the dollar value has increased less than 7 percent annually.
- Currently Federal Government computers consist of 55 percent minicomputers, 30 percent general purpose computers and 15 percent special computers.

  U.S. computers consist of 66 percent minicomputers, 18 percent general purpose computers and 16 percent special computers.
- Over the last six calendar years the number of U.S. computers has increased by over 25 percent annually while the number of Federal computers has increased by less than 11 percent.
- The largest increase in U.S. and Federal general purpose computers was in the size class representing the largest and most expensive computers.
- The largest increase of any segment of the U.S. computers was minicomputers with an increase of 39 percent.

  The largest increase of any segment of Federal computers was minicomputers with an increase of 27 percent.

- Federal Government computers represented 4 percent of the total number of U.S. computers, 3 percent of the U.S. minicomputers and 24 percent of the largest size class of U.S. general purpose computers.

- By agency, DOD accounts for 45 percent of the total Federal computers, 55 percent of the ADP costs and 55 percent of the total ADP work-years.

- Currently, the largest number of ADP work-years are devoted to services and support, and equipment operation.

- As of FY77 less than 20 percent of the Federal computers have acquisition dates prior to FY68.

I. Introduction

The Institute for Computer Sciences and Technology serves as a Federal Government focal point for computer technology activities. The Institute programs are designed to provide standards, guidelines and technical advisory services to improve the effectiveness of computers and computer applications in the Federal Government. Appropriate research provides the foundation for these activities.

In the process of conducting its program, the Institute collects data from a variety of sources on the status of computer technology, the extent of computer use in the government and private sectors and the projected trends in the technology and applications areas. This data is analyzed from a number of points of view in order to support ICST efforts in development of standards and guidelines and in providing technical advisory services. The analyzed data and resulting graphs and charts have proved most useful to ICST personnel.

In the light of its own experience with the utility of this data and analyses, ICST prepared a publication "Computers in the Federal Government: A Compilation of Statistics," (NBS SP-500-7) published in June 1977. Since that time, further data has been collected to support the ADP standards program. Much effort was expended to do more detailed analysis of the size and types of computers in the Federal Government, to ascertain the specific areas which require standards attention. Because of the response to the past publication, ICST decided to make available these further statistical analyses. This version of the compilation of data on computers in the Federal Government will, it is believed, continue to be of general interest within and outside the Federal Government computer community.

The main source of statistical information on computers in the Federal Government is the General Services Administration (GSA). Routinely GSA makes some information available in their publications, "Inventory of Automatic Data Processing Equipment in the United States Government for Fiscal Year 19xx" and "Summary of Federal ADP activities in the United States Government as of the end of Fiscal Year 19xx." The fiscal year figures in this report were generally taken from these publications. In order to make possible a more detailed comparison of Federal and U.S. computers, data for Federal computers on a calendar year basis was required. These figures for Federal computers installed as of year-end 1972 - 1977 were obtained from GSA by special request. Since these figures are not part of GSA's published statistics, and have therefore not received the same amount of scrutiny as the fiscal year figures, they are to be considered estimates of the year-end installed computers in the Federal Government. They are the figures that appear on GSA's data tapes for computers installed as of December 31, 1972, January 31, 1974, December 31, 1975, December 31, 1976, and December 31, 1977. (The January 31, 1974 data tape was the closest data that was available for a year-end figure for 1973. For the purpose of this report these January 31, 1974 figures will be considered year-end 1973 figures.)

The source of statistics on computers in the United States is International Data Corporation (IDC). In the Annual Review and Forecast issue of "EDP Industry Report" IDC publishes a census of computer models in the U.S. and the total number of computers for past, present and future years. Other U.S. figures in this report were obtained from IDC by special request or taken from IDC special reports.

II. Classification System

In the June 1977 report, "Computers in the Federal Government: A Compilation of Statistics," (NBS SP-500-7) Federal computers were categorized by a management classification scheme to identify systems operated under a wide variety of operational environments. This system of classification is still used by the General Services Administration in their publications. The general management classification identifies systems which are used in a general utility environment, whereas the special management classification identifies systems used in control, classified and mobile environments. International Data Corporation, on the other hand, classified U.S. computers into two categories, general purpose computers and dedicated-application computers. The computers included in the general purpose category comprised "the bulk of digital computers (by value) in operation." They were "byte or character oriented-- except for large-scale scientific computers that have large words--and are primarily programmed in higher-level languages." The computers in the dedicated-application category were "those commonly referred to as mini-computers, plus certain larger systems designed primarily for one application such as process control, data communications, or data entry." This classification scheme was used by IDC until 1977.

In the Annual Review and Forecast issue of "EDP Industry Report," for April 22, 1977, IDC announced the establishment of more meaningful computer categories, general purpose computers, minicomputers and small business computers. General purpose computers were divided into six size classes numbered 2 through 7. The definition of general purpose computers remained as listed above except that small business computers formerly in size class 1 were eliminated from the general purpose category. Minicomputers were defined as "...general purpose in design but sold as tools, not just solutions; are available from the makers as complete systems, not just boards; are available to OEM's and usually discounted in volume buys; and are part of a family that has at least one product in the $2,000-$25,000 price range and comes with at least 4K RAM." Small business computers (SBCs) were defined as "...those small general-purpose computers marketed by the major mainframers and their competitors to small business and first time users. They include offerings from the major mainframers...; products...from the minimakers aimed at commercial first time users; offerings from firms that manufacture only SBCs; and offerings from companies that assemble systems from other's minis..."

The April 22, 1977 issue of "EDP Industry Report" also included a model-by-model census for all three categories of computers as of year-end 1976. IDC utilized this same breakout of computers again in their Annual Review and Forecast issue of the "EDP Industry Report" for May 19, 1978, and included a model-by-model census for the three categories of computers as of year-end 1977. Since by definition, small business computers include some minicomputers, the census for small business computers repeats some of the computers in the minicomputer census. The total number of U. S. computers given by IDC is the total of all general purpose computers, minicomputers, small business computers and "other" systems with the double counting of small business and minicomputers eliminated. Thus this total number is smaller than the sum of the number of general purpose, mini and small business computers listed on the censuses.

To facilitate the comparison of U. S. and Federal statistics, special year-end listings of all Federal CPUs by model number were matched with IDC's model-by-model census for U.S. general purpose computers (size class 2 through 7) and minicomputers, assigning IDC's categories and size classes to the Federal CPUs. For purposes of this report, the terms "CPU" and "computer" are used in agreement with GSA's definitions that "...the term computer is synonymous with central processing unit (CPU)." "Computer" should not be confused with "computer system," defined by GSA as "a configuration of ADP equipment which includes one or more CPU's." All other U.S. computers and Federal CPUs except a small number of old general purpose computers were placed in the special category. Using the general purpose, mini and special categories in this manner eliminated the double counting of minis experienced by IDC.

III. Explanation of Computer Categories

General Purpose Computers

In the May 19, 1978 issue of "EDP Industry Report," Annual Review and Forecast issue, page 13, IDC describes general purpose computers as follows: "General-purpose computers . . . comprise the bulk of digital computers by value. They are primarily character or byte oriented and programmed in higher-level language." These general purpose computers are divided into six size classes. IDC describes the size classes as follows, "Instead of being pegged to constantly shifting average values, size classes are based on currently marketed IBM products and other manufacturers' models that compete with them, e.g., a computer in size Class 7 would compete with an IBM 3033 or 168." The size classes are listed for all of the current U.S. computers in the general purpose computer census on page 13 and 14 of the same source quoted above. The average main memory capacity and average monthly rentals are based on currently marketed models in the size classes. In addition to the six classes of IDC, size classes 2 through 7, we added size class 1 for Federal use only. The size classes are defined as follows.*

Size class 1 contains Federal computers of historical interest only. Older computers still in the Federal inventory were placed in this separate size class since they are not really comparable to current computers.

Size Class 2 contains the smallest general purpose computers. They are usually the lowest cost machines and are considered entry level equipment. They have relatively limited I/O channels and limited software. In general the main memory capacity is from 16-64K bytes. The average monthly rental of these machines is approximately $1,250-

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*Certain commercial products are identified in this section in order to cite relevant examples. In no case does such identification imply recommendation or endorsement by the National Bureau of Standards.

$2,500. Examples of computers in this category are: the IBM System 3 Models 4, 6, 8, and 10; Honeywell H-61 Models 58 and 60; Univac 9200; NCR Century 50 and 75; and Singer 10.

Size class 3 computers are generally considered small-scale computers, although some models do approach what is considered to be medium-scale. Some members of this size class are the smallest model of a family of larger computers or the largest member of a small business data processing computer family. The main memory capacity is generally 32-128K bytes, although some size class 3 computers have main memory as large as 256K bytes. The average monthly rental is $2,500-$9,000. Examples of this size class are: NCR Century 100, 101, and 151; Burroughs B-1800 and B-500; Univac 90 Models 25 and 30, and 9300; Honeywell H-Level 62, and H-2020; and IBM 370/115, System 3 Models 12 and 15, and 360/20.

Size class 4 computers are considered medium scale computers. The average main memory capacity is 64-512K bytes. The average monthly rental for size class 4 computers is approximately $8,000-$20,000. Examples of computers in this category are: IBM 370/125, 135, 138, and 360/30 and 40; Honeywell H-2040, 2050, 1200; Univac 90/60; Burroughs B-2500/2700/2800 and B-3500/3700/3800; NCR Century 200, 201,250; CDC Cyber 71, 171; DEC 10/40 and 50; and Xerox Sigma 5 and 6.

Size class 5 computers are also considered medium scale computers but usually have a much larger main memory capacity of 128K - 2M bytes, with some models having memory which exceeds 4M bytes. The average monthly rental of a size class 5 computer is $21,000 - $45,000. Representatives of this size class are: IBM 370/145, 148, and 360/50; Honeywell H-66/10, 17, 20, 27, and H3200; Univac 90/70, 9700, 1100/ 10 and 20 and Spectra 70/45 and 46; Burroughs B-4500, 4700, 4800; NCR Century 300, 8580, 8590; CDC Cyber 72, 3200, 3500, DEC 10/60 and 70; Itel AS/4; and XDS Sigma 7.

Size class 6 computers are generally considered large scale computers Some of the models have main memories as large as 8M bytes. This size category has small members of new families of large computers and the largest members of some old families of computers. The average monthly rental of these computers is $45,000-$95,000. Examples of size class 6 computers include: IBM 3031 and 3032, 360/65, 370/155 and 158; CDC Cyber 172, 173, 174, 73, and 6400, 6500; Itel AS/5 and AS/6; DEC 10/80 and 90; XDS Sigma 9; Burroughs 6500, 6700; Univac 1100//40, 81 and 82, 1106 and Spectra 70/60, 6 and 7; Honeywell H-66/40 and 60, 6050/60, 6070 and 6080; and Amdahl 470/5.

Size class 7 computers are the largest computers in the general purpose category and in the U.S. installed base. These computers represent the largest models of a manufacturers product line. The largest members of this size class can have main memory capacity of 16M bytes. The average monthly rental of these machines is approximately $100,000- $200,000. Representatives of this size class are: IBM 3033, 370/165 and 168; Univac 1100/83 and 84, 1108, 1110; CDC Cyber 175, 176, 75 and 76, Star 100, 6600, 7600; Amdahl 470/6 and 7; Cray 1A; Burroughs B-7700, 7800; Honeywell H-66/80 and 85, H68/80, G-6180.

Minicomputers

In the May 19, 1978 issue of "EDP Industry Report," Annual Review and Forecast issue, page 17, IDC describes minicomputers as follows: "The categorization of certain computers as 'minicomputers' is based on marketplace definitions as perceived by IDC. Minis are general-purpose in design but sold as tools, not just solutions; are available from the makers as complete systems, not just boards; are available to OEMs and usually discounted in volume buys; and are part of a family that has at least one product in the $2,000- $25,000 price range and comes with at least 4K RAM." This definition was adopted in matching Federal computers with the IDC census. The three size classes listed in the IDC minicomputer census were not used for this report because there was insuffcent GSA data to match them. Therefore, all Federal and U.S. minicomputers are in one category.

Special computers

The special computer category for Federal and U.S. figures includes computers which are not identified as general purpose computers or minicomputers. These "special" computers include computers such as small business machines, communications processors, data entry machines and process control computers. Special militarized or ruggedized machines are included in Federal figures only.

IV. Structure of Report

The rest of this report is divided into two parts, one on fiscal year data and one on calendar year data. The section on fiscal year data is mainly based on data available from GSA on Federal ADP. This includes number of Federal computers, computer systems by purchase price, number of computers and ADP costs by agency, computers by Federal acquisition date and analysis of Federal ADP work-years. The second section on calendar year data is based on U.S. data from IDC and Federal data developed by NBS for this report. This section presents the results of detailed analysis on the type and size of computers in the Federal Government. These results are then compared with the same analysis for the U.S. computers to look at growth rates and trends for the Federal computers. All of the figures are year-end figures and should not be compared with the data in the fiscal year section.

V. Fiscal Year Data

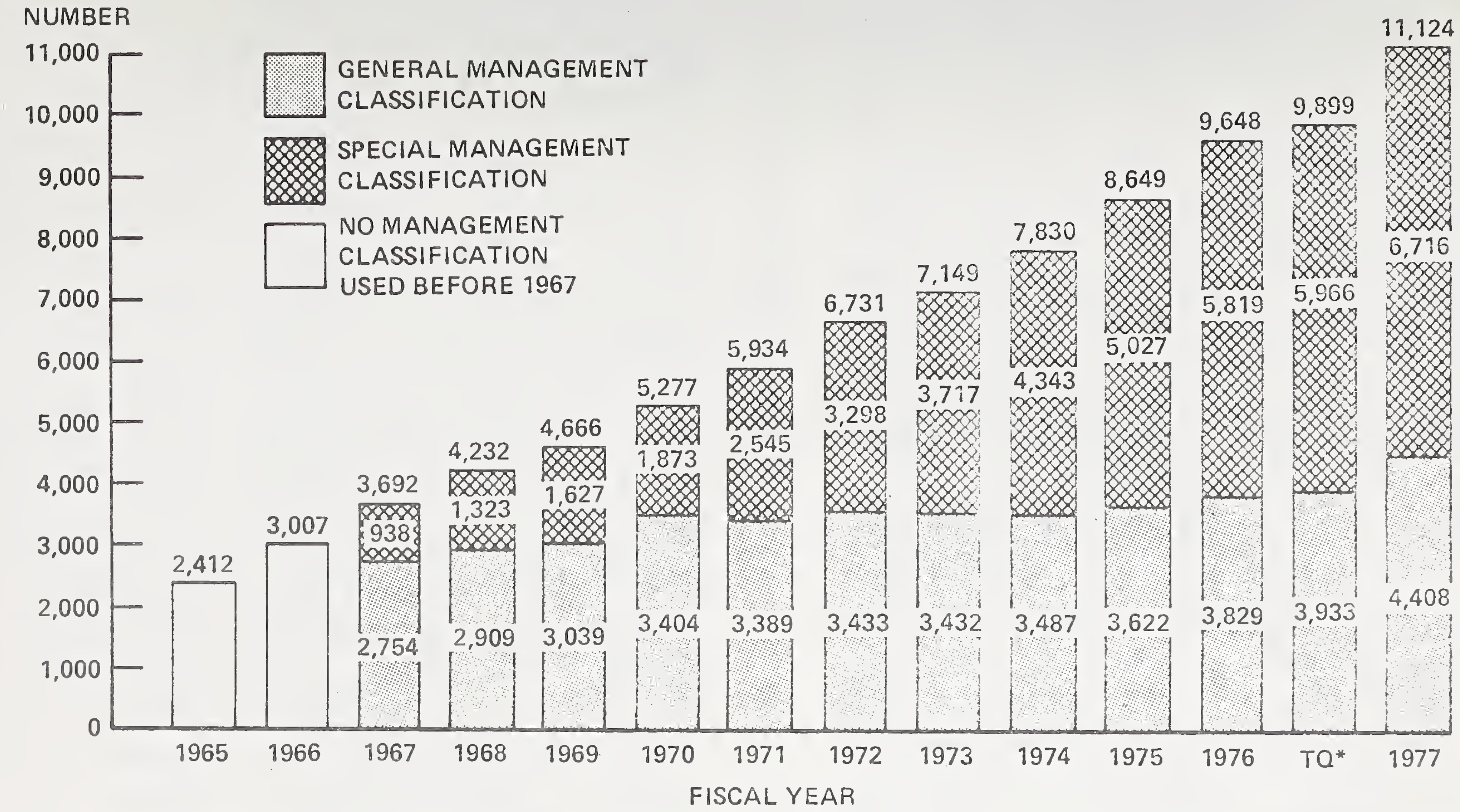
A. Federal Government Statistics

Figure 1 summarizes the number of computers in the Federal Government from Fiscal Year 1965 to Fiscal Year 1977, including the transition quarter between fiscal year 1976 (July 1, 1975 - June 30, 1976) and fiscal year 1977 (October 1, 1976 - September 31, 1977). Figure 1 also shows the classification of the computers into GSA general management and special management categories. As mentioned in the introduction, the general management category includes computers in the general utility environment. Figure 1 shows that the general management category has remained relatively stable by number and currently represents almost 40 percent of the Federal computers. Even though the number of general management computers has grown slightly over the last eight years, their percentage in the Federal inventory has dropped from 64 percent in fiscal year 1970 to less than 40 percent in fiscal year 1977.

The largest number of Federal computers are in the special management category. In addition to mobile and control computers, a large number of these computers are minicomputers. Figure 1 shows that the special management category of computers has grown considerbly since fiscal year 1970, doubling the number of computers in that category from fiscal year 1970 to fiscal year 1977. In addition, the percentage of Federal computers in the special management category has grown from 35 percent in fiscal year 1970 to over 60 percent in fiscal year 1977.

Figure 2 shows data on the number of computers in the Federal Government, their growth rate from 1970 to 1977 and the total dollar value of Federal computer systems and its growth rate from 1970 to 1977. The dollar values for computer systems have not been adjusted for inflation and are not presented in constant dollars. The growth rates are based on the increase in CPUs for one year compared to the total CPUs of the year before. The average yearly growth rate may also be called the average compound growth rate. The dollar values are presented for Federal computer systems instead of CPUs alone. We consider that when discussing the dollar value it is not correct to value only the CPU. The other components of the system need to be included. For example, the additional memory units that a system may have

COMPUTERS IN THE FEDERAL GOVERNMENT BY MANAGEMENT CLASSIFICATION



* TQ: Transition Quarter (July 1, 1976 – September 30, 1976)

September 30, 1977

Source: GSA Inventory 1977

FIGURE 1

GROWTH RATE OF COMPUTER SYSTEMS IN THE FEDERAL GOVERNMENT BY NUMBER OF CPUs AND DOLLAR VALUE

Fiscal Year	Total # of CPUs	# CPUs added per year	Growth Rate (%)	Total Value of Computer Systems ($ Billions)	$ Added per year ($ Billions)	Growth Rate (%)
1970	5,277			$2.801		
		657	12.45		.271	9.68
1971	5,934			3.072		
		797	13.43		.122	3.97
1972	6,731			3.194		
		418	6.21		.266	8.33
1973	7,149			3.460		
		681	9.53		.340	9.83
1974	7,830			3.80		
		819	10.46		.240	6.32
1975	8,649			4.04		
		999	11.55		.08	1.98
1976	9,648			4.12		
		1,476	15.30		.33	8.01
1977	11,124			4.45		
Average		835	11.28%		.235	6.87%

Figure 2

make a difference in the dollar value of the system. We feel that this higher dollar value of the computer systems creates a more accurate dollar value of the computer hardware in the Federal Government. These dollar values are also more consistent with IDC's dollar values.

The dollar value of Federal computer systems for FY77 was $4.45 billion. The dollar values of the computers systems from FY70 to FY77 has been increasing on an average of $.235 billion per year for an average yearly growth rate of less than 7 percent. For the same time period the number of computers has been growing at a larger rate than the growth rate of the dollar value. In the last fiscal year there were over 1,000 computers added to the Federal inventory. The average for the last eight fiscal years was 835 computers added per year. This means that there is an average yearly growth rate of numbers of computers for the eight fiscal years of over 11 percent. The fact that the number of computers continues to grow at a greater growth rate than the dollar value indicates that smaller, less expensive computers are being added to the Federal inventory. This indication is also shown in the section of this report on computers by purchase price range.

B. Federal Government Statistics Compared with U.S. Statistics

There is not a significant amount of data for fiscal year figures which make comparisons of Federal and U.S. figures possible. However, since the only dollar value figures that are available for the Federal computers are fiscal year dollar values, we have approximated the U.S. figures that were available to reflect fiscal year figures. Figure 3 presents these adjusted U.S. figures for both numbers of computers and dollar values. On an average 33,000 computers have been added to the U.S. installed base per fiscal year for an average yearly growth rate of over 24 percent. The growth rate by dollar value for these fiscal year figures is over 11 percent with an average of $3.63 billion being added each fiscal year to the dollar value of the installed base. Thus these figures show that for the adjusted U.S. figures the number of computers continues to grow at a larger rate than the dollar value.

GROWTH RATE OF COMPUTER SYSTEMS IN THE UNITED STATES BY NUMBER OF CPUs AND DOLLAR VALUE

Fiscal Year	Total # of CPUs	# CPUs added per year	Growth Rate (%)	Total Value of Computer Systems ($ Billions)	$ Added per year ($ Billions)	Growth Rate (%)
1970	62,550			$21.65		
		13,200	21.10		2.40	11.08
1971	75,750			24.05		
		17,850	23.56		1.90	7.90
1972	93,600			25.95		
		25,025	26.74		2.40	9.24
1973	118,625			28.35		
		31,550	26.60		3.40	11.99
1974	150,175			31.75		
		36,925	24.59		4.00	12.60
1975	187,100			35.75		
		44,200	23.63		4.70	13.15
1976	231,320			40.45		
		62,630	27.08		5.90	14.59
1977	307,635			46.35		
Average		33,057	24.76		3.53	11.51%

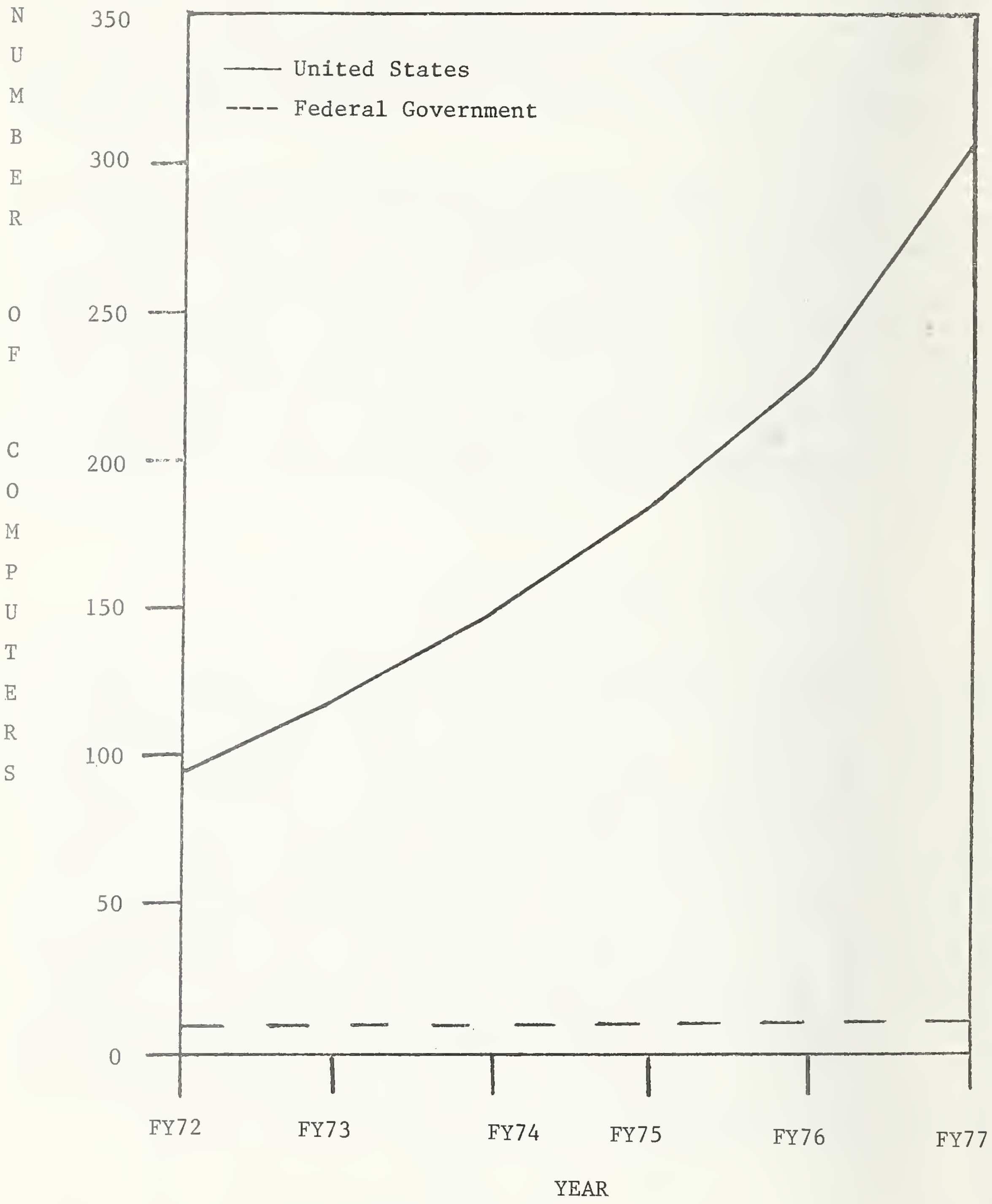
Figure 3

When these growth rate figures are compared (figures 2 and 3) it is apparent that the growth rates of U.S. and Federal computer system dollar values are more closely related than the growth rate by number. The average growth rate of U.S. computers by dollar value is over 11 percent while the Federal average growth rate by dollar value is 7 percent. The difference between these two growth rates is less than the difference between the growth rates by number which are 25 percent for the U.S. and 11 percent for the Federal computers.

Figures 4 and 5 show the total Federal and U.S. computers by number and dollar value for fiscal years 72 - 77 in graph form. These comparisons show what portion of the U.S. installed base is held by the Federal Government. Figure 4 shows that the Federal Government computers represented about 8 percent of the U.S. installed base by number in FY72 but represented less than 4 percent in FY77. Figure 5 shows that the Federal Government represented almost 13 percent of the dollar value of U.S. computers in FY70 but less than 10 percent in FY77. Thus when the Federal Government figures are compared with the U.S. the Federal portion is much greater by dollar value than by number.

C. Federal Computer Systems by Purchase Price

The only information that is available from GSA for a more detailed analysis of the dollar value of specific Federal computer systems is a listing of the costs of computer systems for general and special management computers by five price categories: $50,000 or less; $50,001-$200,000; $200,001-$500,000; $500,001-$1,500,000; and over $1,500,000. Data from these price listings was compiled for six years and is presented in figures 6 and 7. The dollar values of the price categories for the computer systems have not been adjusted for inflation and are not presented in constant dollars. The data was compiled as GSA presented it for each fiscal year. For purposes of smoothing the numbers the general management and special management computer systems were added together. Figures 6 and 7 show that the largest numbers of computer systems are in the $50,000 or less category and the $50,001-$200,00 category. It is apparent in figure 7 that the curves of these two categories reflect a growing trend that should be expected to continue in the future.



TOTAL COMPUTERS (in Thousands)

Figure 4

TOTAL DOLLAR VALUE OF COMPUTER SYSTEMS
(in $Billions)

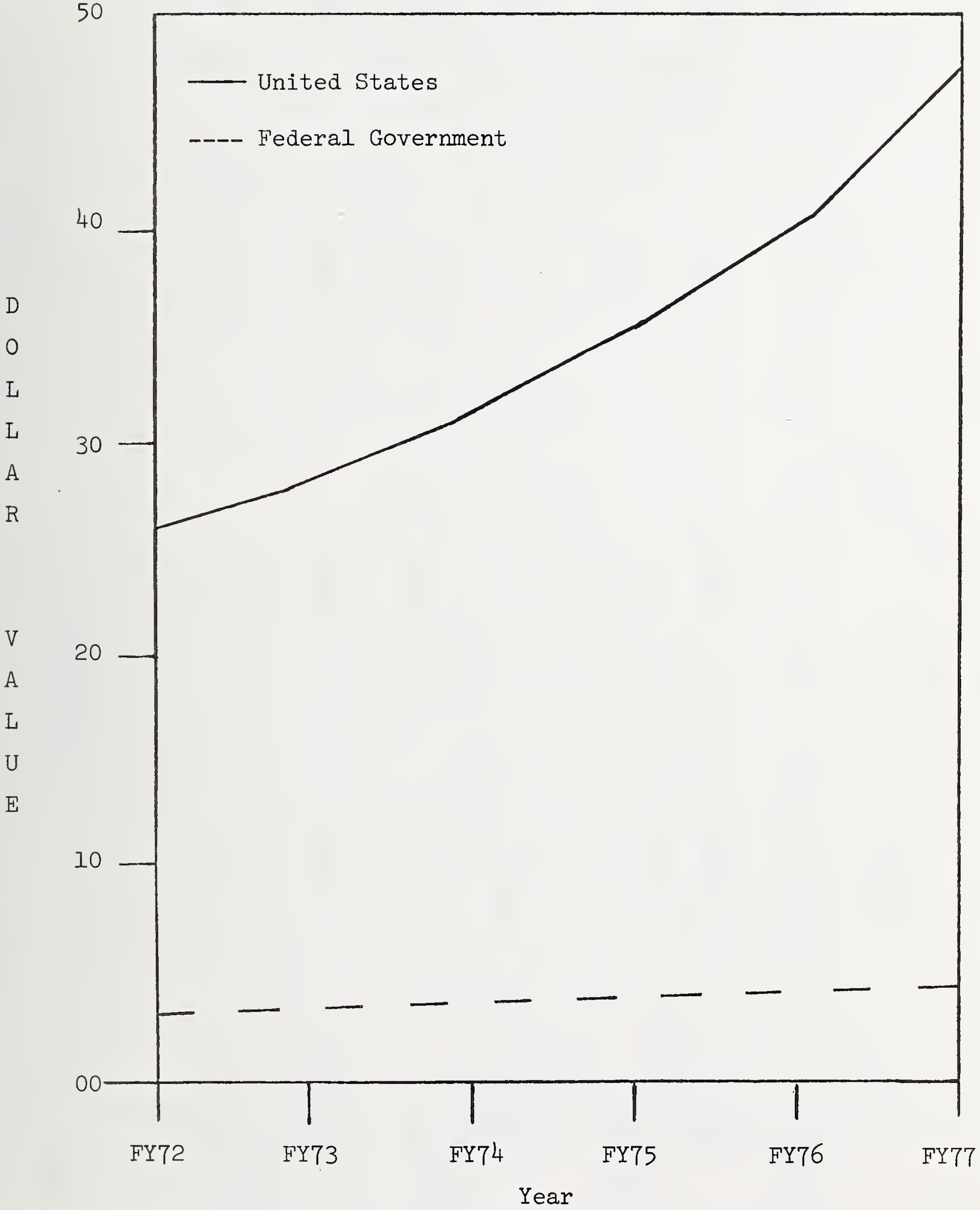


Figure 5

FEDERAL COMPUTER SYSTEMS BY PURCHASE PRICE

YEAR	$50,000/LESS	$50,001-$200,000	$200,001-$500,000	$500,001-$1,500,000	OVER $1,500,000
FY 72	1502	1683	1288	825	505
FY 73	1648	1686	1264	844	572
FY 74	1963	1766	1224	861	636
FY 75	2262	1931	1220	901	667
FY 76	2612	2184	1202	867	662
FY 77	3269	2399	1279	882	699

Figure 6

FEDERAL COMPUTER SYSTEMS BY PURCHASE PRICE

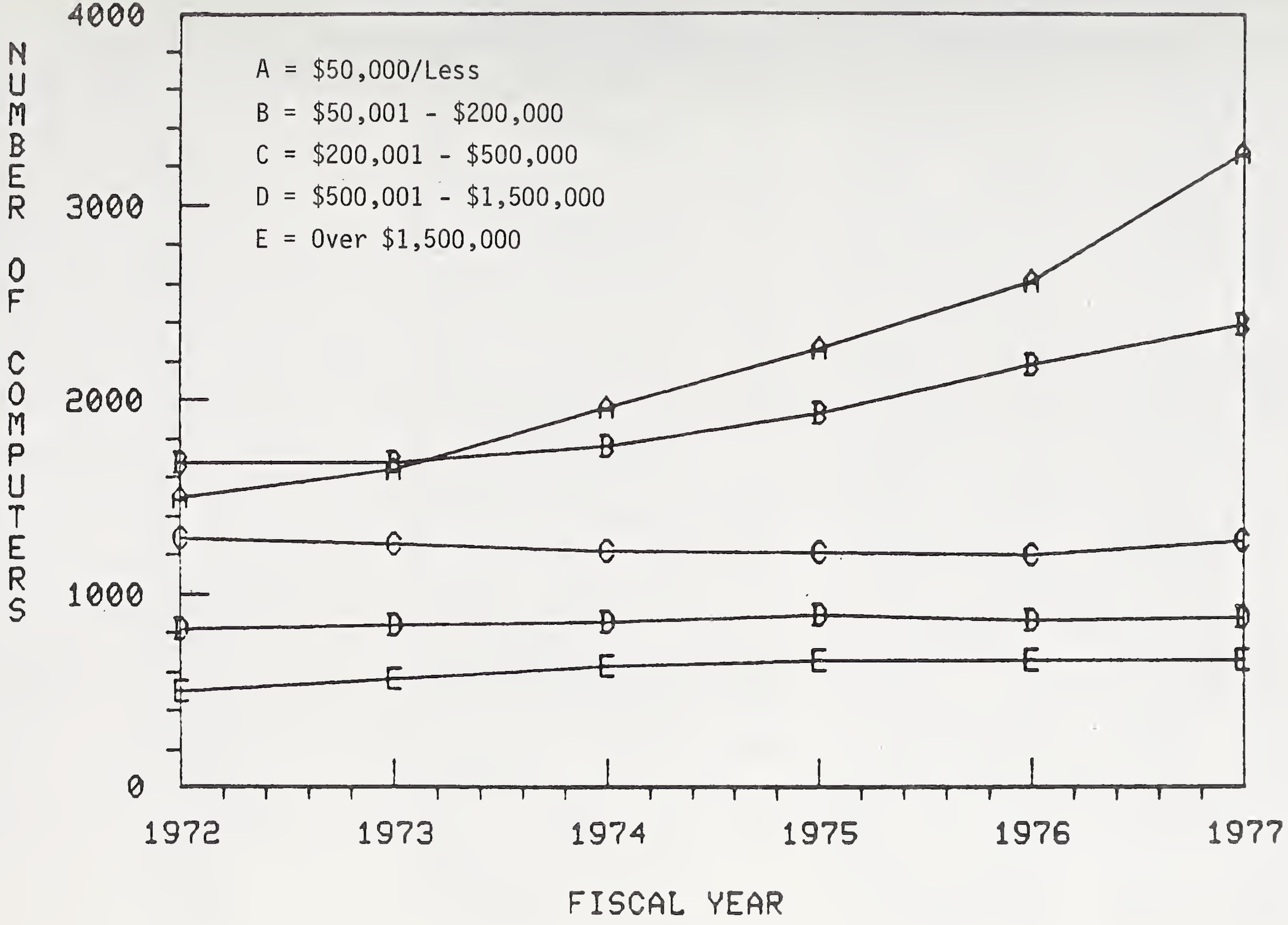


FIGURE 7

We analyzed the growth rate figures, shown in figure 8, for these price categories to see if they agreed with the plotted curves and to assess the actual growth rates. The smallest price category, $50,000 or less has the largest average growth rate of all the price categories with a growth rate of 17 percent. The categories with the next highest growth rates were the $50,001-$200,000 and the over $1,500,000 category. These both have an average growth rate of 7 percent. The computer systems in the $200,001-$500,000 category showed no growth rate when averaged over the six fiscal years and the computer systems in the $500,001-$1,500,000 category showed little average growth.

Thus the analysis by purchase price classification showed essentially that the least expensive computer systems represented the largest number of computer systems and the largest growth rate of any of the price categories. The most expensive computer systems represent the smallest number of computer systems and the second highest growth rate of any of the price categories. The computer systems in the middle price categories seem to be showing little or no growth.

D. Analysis of Federal Computers and ADP Costs by Agency

Until further analysis on the function and uses of Federal computers can be undertaken, the only data that is available is that on the numbers of computers and ADP costs by agency. Data was compiled for twelve fiscal years, FY66-FY77, on the numbers of computers and the ADP costs by agency.* The number of computers, both general management and special management, is presented in figure 9. These numbers were translated into percentages and are presented in figure 10. The pie chart, figure 11, highlights the changes in these percentages between FY67 and FY77.

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*Throughout this section the abreviations for each agency are GSA's Federal Departmental/Agency abreviations.

GROWTH RATE OF COMPUTER SYSTEMS BY PURCHASE PRICE CLASSIFICATION

	$50,000/LESS			$50,001-$200,000			$200,001-$500,000			$500,001-$1,500,000			OVER $1,500,000		
YEAR	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)
FY 72	1502			1683			1288			825			505		
		146	10%		3	0%		-24	-2%		19	2%		67	13%
FY 73	1648			1686			1264			844			572		
		315	19%		80	5%		-40	-3%		16	2%		64	11%
FY 74	1963			1766			1224			861			636		
		299	15%		165	9%		-4	-0%		40	5%		31	5%
FY 75	2262			1931			1220			901			667		
		350	15%		253	13%		-18	-1%		-34	-4%		-5	-1%
FY 76	2612			2184			1202			867			662		
		657	25%		215	10%		77	+6%		15	2%		37	6%
FY 77	3269			2399			1279			882			699		
AVG.		353	17%		143	7%		-2	0%		11	1%		39	7%

Figure 8

ANNUAL FEDERAL INSTALLED COMPUTER BASE BY AGENCY

	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73	FY74	FY75	FY76	FY77
Agri	28	32	37	39	42	68	66	61	58	56	66	97
Comm	47	41	53	59	73	99	142	170	241	294	321	363
DOD	1923	2335	2694	2898	3199	3415	3733	3791	4007	4245	4424	5059
ERDA	256	324	415	559	754	954	1148	1311	1574	1904	2279	2605
GSA	24	31	24	27	27	33	29	30	29	28	29	30
HEW	45	57	80	84	96	88	67	94	104	134	140	160
Int	27	34	35	47	46	39	51	55	70	69	114	141
NASA	489	616	639	642	692	812	934	991	1028	1114	1255	1441
Trans	31	58	61	100	118	149	236	287	296	317	346	347
Treas	58	52	59	68	77	90	106	122	124	150	158	202
VA	17	29	35	40	41	64	77	88	99	126	141	201
Other Civil	62	83	100	103	112	150	142	149	200	212	375	478
Total No. of Computers	3007	3692	4232	4666	5277	5961[1]	6731	7149	7830	8649	9648	11124

[1] For FY72 and for each fiscal year thereafter, the GSA Inventory reported the total number of computers in FY71 to be 5934.

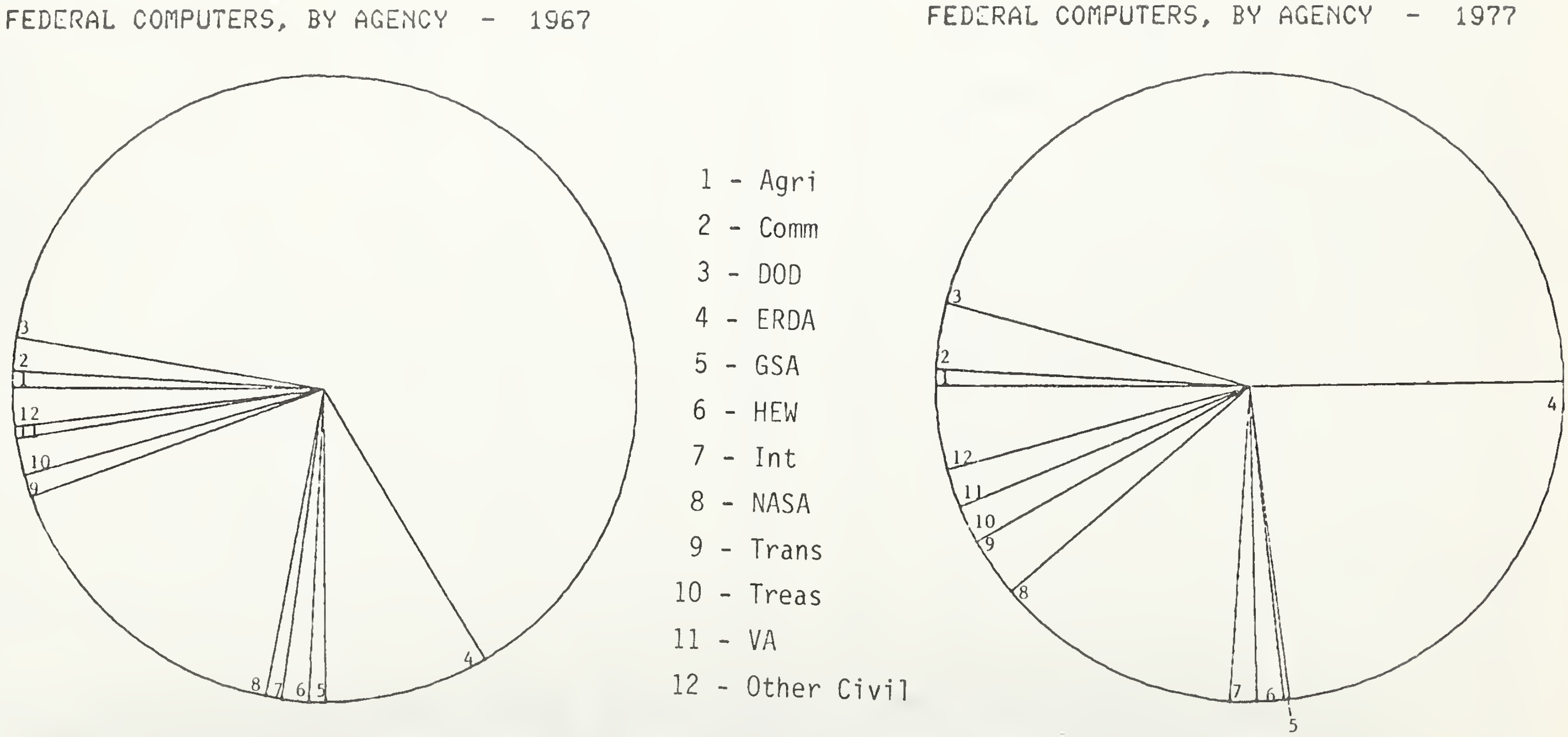
Source: Data for FY66 thru FY69 in the GSA Inventory, FY69; Data for FY70 thru 1977 in the GSA Inventories FY70 thru FY77 respectively.

Figure 9

AGENCY PERCENTAGE OF ANNUAL FEDERAL INSTALLED COMPUTER BASE

	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73	FY74	FY75	FY76	FY77
Agri	.93	.87	.87	.83	.80	1.14	.98	.85	.74	.65	.68	.87
Comm	1.56	1.11	1.25	1.26	1.38	1.66	2.11	2.38	3.08	3.40	3.33	3.26
DOD	63.95	63.24	63.66	62.11	60.62	57.29	55.46	53.03	51.18	49.08	45.85	45.48
ERDA	8.51	8.78	9.81	11.98	14.29	16.00	17.06	18.34	20.10	22.01	23.62	23.42
GSA	.80	.84	.57	.58	.51	.55	.43	.42	.37	.32	.30	.27
HEW	1.50	1.54	1.89	1.80	1.82	1.48	.99	1.32	1.33	1.55	1.45	1.44
Int	.90	.92	.83	1.01	.87	.66	.76	.77	.89	.80	1.18	1.27
NASA	16.26	16.68	15.10	13.76	13.11	13.62	13.88	13.86	13.13	12.88	13.01	12.95
Trans	1.03	1.57	1.44	2.14	2.24	2.50	3.51	4.01	3.78	3.67	3.59	3.12
Treas	1.93	1.41	1.39	1.46	1.46	1.51	1.57	1.71	1.58	1.73	1.64	1.81
VA	.57	.79	.83	.86	.78	1.07	1.14	1.23	1.27	1.46	1.46	1.81
Other Civil	2.06	2.25	2.36	2.21	2.12	2.52	2.11	2.08	2.55	2.45	3.89	4.30
Total Percentage	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Figure 10


FEDERAL COMPUTERS, BY AGENCY - 1967
FEDERAL COMPUTERS, BY AGENCY - 1977
1 - Agri
2 - Comm
3 - DOD
4 - ERDA
5 - GSA
6 - HEW
7 - Int
8 - NASA
9 - Trans
10 - Treas
11 - VA
12 - Other Civil
3
2
12
10
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4

Figure 11

The agencies showing the largest growth rate in numbers of computers between FY66 and FY77 are Energy Research and Development Administration (ERDA) now part of Department of Energy (DOE), Department of Transportation (DOT) and Veterans Administration (VA). In FY77 all three of these agencies have over ten times the number of computers they had in FY66. By percent, ERDA had 8.51 percent of the Federal computers in FY66 and 23.42 percent in FY77. Transportation grew from 1.03 percent of the Federal computers in FY66 and 3.12 percent in FY77. VA also grew with .57 percent in FY66 and 1.18 percent in FY77. When the figures are plotted in pie chart form, figure 11, these increases can be easily noticed as are the decreases in the portion of the Federal computers for DOD and NASA. NASA has actually dropped from approximately 16 percent of the Federal computers in FY66 to less than 13 percent in FY77. DOD has dropped from almost 64 percent in FY66 to approximately 45 percent in FY77. Figure 9 shows that both Department of Defense (DOD) and National Aeronautics and Space Administration (NASA) increased the number of computers installed over these years but their percentages of the total computers dropped.

Figure 12 shows the dollar value of the annual costs for Federal ADP, general management category, by agency. Since no cost data is required to be reported to GSA for any computers in the special management category, the annual costs for Federal ADP special management category are unavailable. The dollar values shown are given in actual dollars, not constant dollars. Some of the ADP expenditures included in these annual ADP costs include equipment purchase, site preparation, equipment rental, personnel, contract service, support products and other operating costs. The largest increases for agencies by dollar value are Treasury with an increase of $437M, from $42M in FY65 to $479M in FY77 and Commerce with an increase of $80M, from $19M in FY65 to $99M in FY77. The "Other Civil" category has also increased significantly. When these costs are examined by agency percentages, figure 13, Treasury has increased from almost 4 percent of the total Federal ADP costs (general management classification) in FY65 to over 13 percent in FY77. Commerce represented a small increase from almost 2 percent of the total in FY65 to almost 3 percent in FY77.

ANNUAL FEDERAL ADP COSTS BY AGENCY
GENERAL MANAGEMENT CLASSIFICATION
($ MILLIONS)

	FY65	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73	FY74	FY75	FY76	FY77
Agri	$ 15	$ 15	$ 21	$ 18	$ 24	$ 26	$ 34	$ 49	$ 50	$ 43	$ 51	$ 51	$ 59
Comm	19	17	23	33	38	39	47	59	67	68	85	95	99
DOD	684	742	880	992	1093	1281	1417	1416	1499	1470	1568	1633	1937
ERDA	81	95	99	120	135	130	160	116	124	147	154	200	206
GSA	10	15	16	14	11	14	17	20	19	30	65	40	40
HEW	32	42	57	68	80	94	109	89	139	132	233	252	156
Int			8	11	14	17	22	19	22	24	35	40	52
NASA	187	131	140	151	140	172	149	147	150	156	170	160	170
Trans			12	14	14	17	23	24	32	31	39	44	51
Treas	42	48	113	140	170	205	233	288	298	324	447	453	479
VA	16	17	18	20	30	40	32	37	44	39	52	60	70
Other Civil	46	59	58	72	81	90	139	163	207	198	201	160	229
Total	$1132	$1182	$1445	$1653	$1830	$2125	$2382	$2427	$2651	$2662	$3100	$3188	$3548

Figure 12

Agency Percentage Of Annual Federal ADP Costs
General Management Classification

	FY65	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73	FY74	FY75	FY76	FY77
Agri	1.33	1.27	1.45	1.09	1.31	1.22	1.43	2.02	1.88	1.62	1.64	1.60	1.66
Comm	1.68	1.44	1.59	2.00	2.08	1.84	1.97	2.43	2.53	2.55	2.74	2.98	2.79
DOD	60.42	62.83	60.90	60.01	59.73	60.28	59.49	58.34	56.54	55.22	50.58	51.22	54.59
ERDA	7.16	8.04	6.85	7.26	7.38	6.12	6.72	4.78	4.68	5.52	4.97	6.27	5.81
GSA	.88	1.27	1.11	.85	.60	.66	.71	.82	.72	1.13	2.10	1.26	1.13
HEW	2.83	3.56	3.95	4.11	4.37	4.42	4.58	3.67	5.24	4.96	7.52	7.90	4.40
Int			.55	.66	.76	.80	.92	.78	.83	.90	1.13	1.26	1.47
NASA	16.52	11.09	9.69	9.13	7.65	8.09	6.25	6.06	5.66	5.86	5.48	5.02	4.79
Trans.			.83	.85	.76	.80	.97	.99	1.21	1.16	1.26	1.38	1.44
Treas	3.71	4.06	7.82	8.47	9.29	9.65	9.78	11.87	11.24	12.17	14.42	14.21	13.50
VA	1.41	1.44	1.25	1.21	1.64	1.88	1.34	1.52	1.66	1.47	1.68	1.88	1.97
Other Civil	4.06	5.00	4.01	4.36	4.43	4.24	5.84	6.72	7.81	7.44	6.48	5.02	6.45
Total %	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

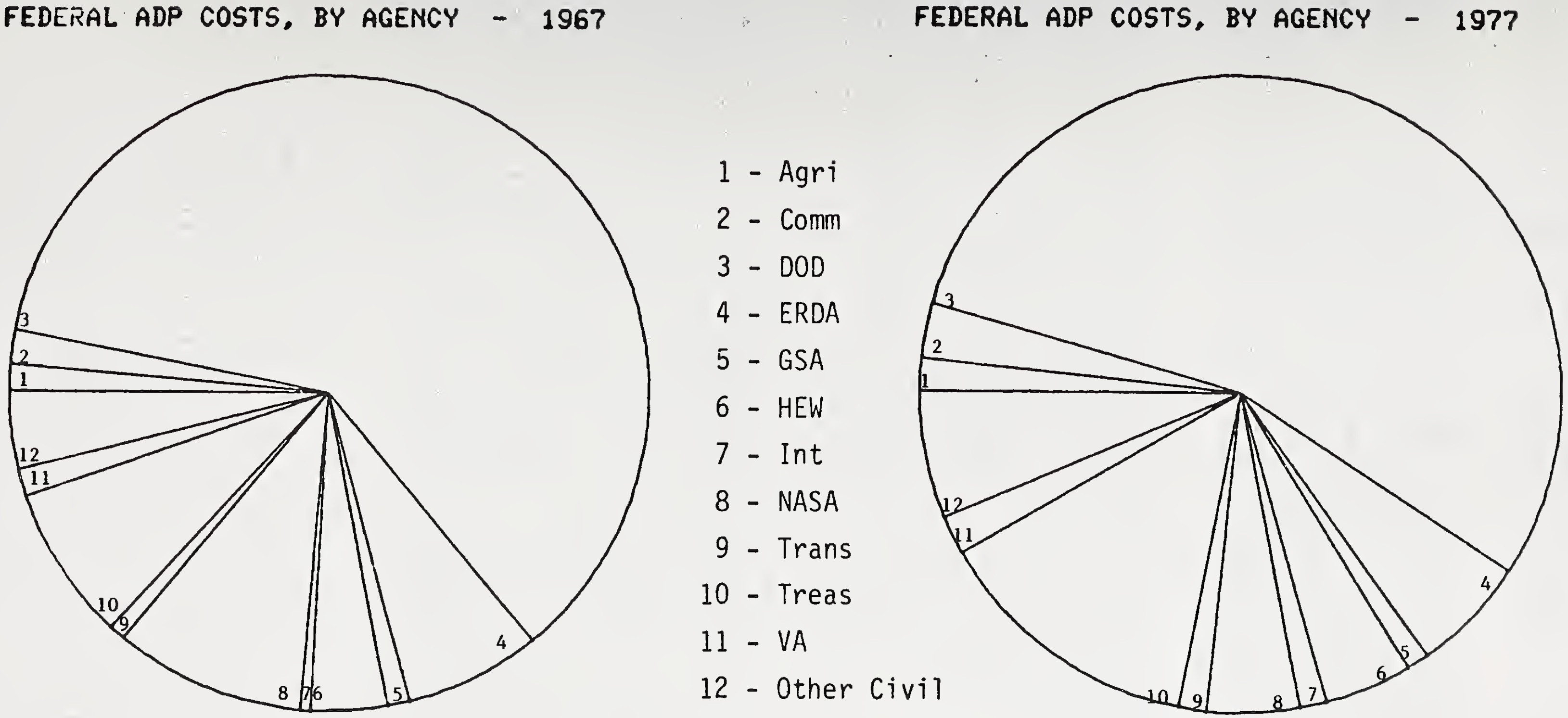
Figure 13

The growth of both Treasury and Commerce are graphically visible in the two pie charts, figure 14. These two graphs of the annual costs for ADP, general management category, for FY67 and FY77 not only show the increase in Treasury and Commerce but also show the decrease in the portion of the total represented by DOD and NASA. DOD has decreased from over 60 percent of the total costs in FY67 to less than 55 percent in FY77. NASA has decreased from almost 10 percent of the total in FY67 to less than 5 percent in FY77. Thus, not only has the portion of the total Federal computers represented by DOD and NASA (previous part of this section) decreased but also their portion of the annual ADP costs.

E. Computers by Federal Acquisition Date

In the explanation of size classes, size class 1 was identified as historical computers in the Federal Government. Because of a Congressional request, and other questions on the age of the computers in the Federal Government, an analysis was made of the date of purchase of the computers in the Federal inventory. Special computer runs were obtained from GSA of computers installed by Federal acquisition date. The Federal acquisition date, according to the GSA ADP Management Information System Reporting Procedures dated February 1, 1971, and updated through June 13, 1975, is the date of machine acquisition in the Federal Government. Acquisition is "a term which describes the actual purchase of a machine or system from a source outside the Federal Government or describes the initial lease of a machine or system by an agency of the Federal Government from an external source." Agencies were required to provide this acquisition date for machines acquired after June 30, 1971. The date was entered for machines acquired before this date on a voluntary basis. Machines with no acquisition date are in the "not specified" category.

It should be noted that this date is very different from an actual installation date or delivery date. Often contracts are signed for purchasing a computer in one year and the machine is not delivered and accepted until the next year. Since the GSA inventory data is provided by each agency for equipment actually installed, many computers appearing in the inventory for the first time will have an acquisition data of a year or two prior to the inventory



FEDERAL ADP COSTS, BY AGENCY - 1967

FEDERAL ADP COSTS, BY AGENCY - 1977

Figure 14

date. For example, the majority of computers which have an acquisition date of FY77 will not appear until the FY78 or FY79 inventory. This explains why the last acquisition date for each of the years examined shows a decline in the number of computers.

Figure 15 shows that as of year-end 1977 there were still a number of older computers in the Federal inventory. There were 1,514 computers that were ten years old or older, not including the computers that were not specified. These older computers, however, only represented 13 percent of the total Federal computers. Even if all of the not specified computers were added to the 1,514 older computers, the total would still only represent less than 20 percent of the Federal computers.

Some of the data does appear to be inconsistent for the oldest acquisition dates. For example, it appears that suddenly in 1975 two additional computers with acquisition dates of 1956 were identified. This can only be explained by differences in reporting procedures. Since each agency provides an accounting of the computers installed each year, we presume that in 1975 some agency did a more thorough job of reporting and listed computers which had been overlooked in previous years. It is obvious that these computers were in the Federal inventory somewhere in 1972, 73, and 74 but for some reason were simply not listed.

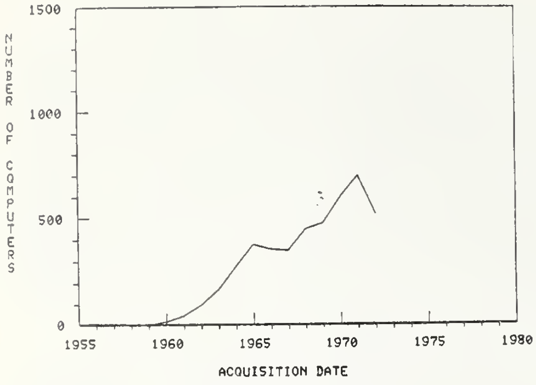
Figure 16 shows graphically the number of computers by Federal acquisition date as of year-end 1972-1977. As was explained earlier in this section, the decline at the end of each year is due to the nature of the reporting procedures and the definition of Federal acquisition date. The solid line on each graph represents the most recent year or the number of computers installed as of the date on the bottom of each graph. The dotted lines indicate previous years. By 12/31/76 and 12/31/77 the number of older computers, computers with acquisition dates prior to 1968, were declining. It is presumed that these older computers will continue to decease in number as they are replaced by newer systems.

COMPUTERS BY FEDERAL ACQUISITION DATE

Installed CPUs as of	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Not Specfd	Total
12/31/72	1	1	1	2	18	44	98	171	277	379	357	350	448	477	600	696	517						2375	6812
12/31/73	1	1	1	2	15	40	92	166	274	358	361	321	463	465	594	717	870	440					2189	7370
12/31/74	1	1	0	0	13	41	85	153	248	327	330	312	454	445	591	751	1033	884	572				1945	8186
12/31/75	3	1	6	4	12	60	110	195	260	391	443	349	525	581	765	814	1038	1006	1005	437			875	8880
12/31/76	3	1	6	4	8	53	109	154	214	350	404	323	489	559	734	808	1044	1059	1128	1128	431		721	9730
12/31/77	3	0	2	5	9	57	100	132	195	318	371	322	459	562	719	827	1069	1062	1210	1480	1140	514	676	11232

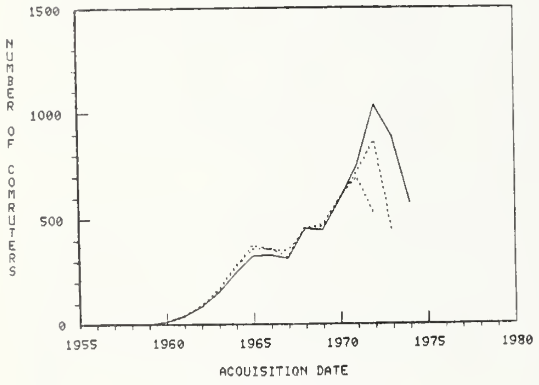
FIGURE 15

COMPUTERS BY FEDERAL ACQUISITION DATE



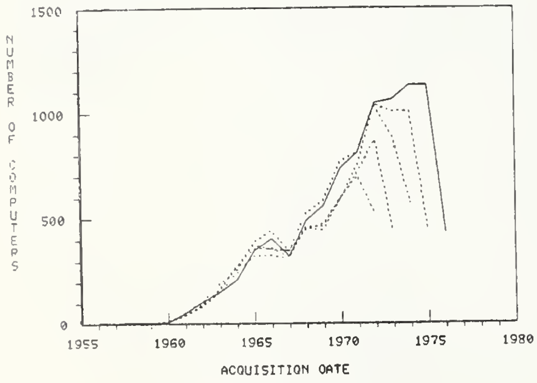
INVENTORY AS OF 12/31/72

INVENTORY AS OF 12/31/73



INVENTORY AS OF 12/31/74

INVENTORY AS OF 12/31/75



INVENTORY AS OF 12/31/76

INVENTORY AS OF 12/31/77

Figure 16

F. Analysis of Federal ADP Work-Years

The first part of this analysis of Federal ADP work-years is based on data from GSA's charts titled "ADP Work-Years by Activity - General Management Classification." GSA defines number of ADP work years as "the number of work-years of all civilian and military personnel whose principal duties are directly identified with ADP functions." Data was collected and analyzed for fiscal years 67-77 on the following ADP activities: systems analysis and design, programming, key punch and key verify, ADPE selection, in-house maintenance, services and support and equipment operation. The definitions of these ADP activities are given in the "Summary of Federal ADP Activities in the United States Government," as of the end of Fiscal Year 1976, General Services Administration, page 35. Figure 17 shows the number of work-years for each activity and what percent each activity represents of the total for FY67 through FY77. A line graph of each of the activities for all eleven fiscal years and a line graph of the total ADP work-years is shown in figure 18. Figure 19 is a bar graph of these activities for FY67 and FY77. These two bar graphs serve to highlight the major changes that have occured over these eleven fiscal years.

Systems analysis and design is a job activity whose number of work-years increased 117 percent from FY67 to FY77. In FY67 there were 8027 work-years involved with this activity and 17483 work-years in FY77. This activity represented almost 8 percent of the total work-years in FY67 and over 14 percent in FY77. This growth in the portion of the total is the largest of any job activity. As the line graph figure 18 shows, systems analysis and design has been consistently increasing over these eleven fiscal years and should probably continue to do so in the future.

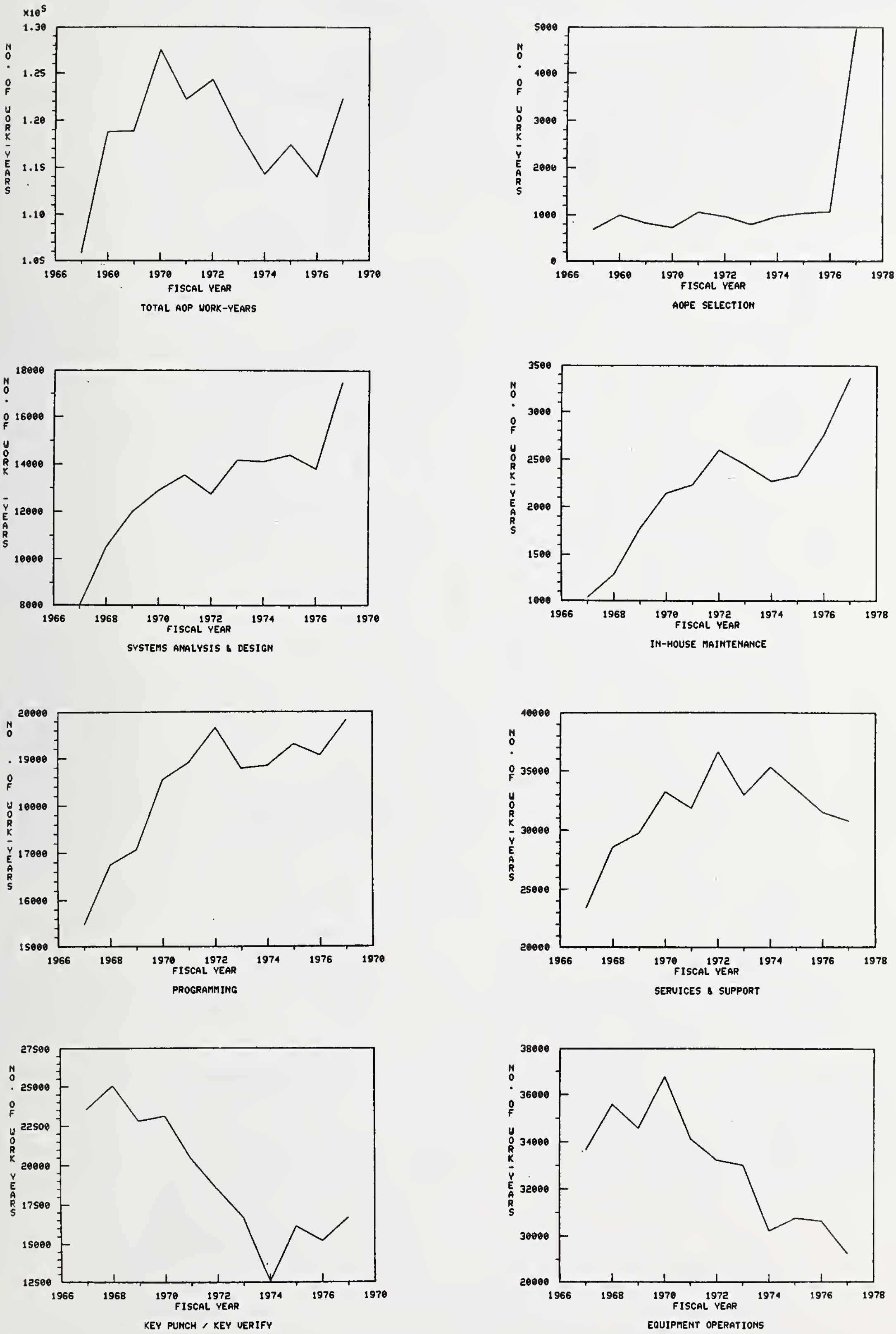
Programming is another job activity which has also been increasing in number of work-years. There were 15492 work-years involved in programming in FY67 and 19813 in FY77 for an increase of 28 percent. Programming represented almost 15 percent of the total work years in FY67 and over 16 percent in FY77. The increase in programming has been a steady gradual increase that is expected to continue.

ANALYSIS OF FEDERAL ADP WORK-YEARS

	SYSTEMS ANALYSIS AND DESIGN		PROGRAMMING		KEY PUNCH AND KEY VERIFY		ADPE SELECTION		IN-HOUSE MAINTENANCE		SERVICES AND SUPPORT		EQUIPMENT OPERATION		TOTAL	
	Work Years		Work Years		Work Years		Work Years		Work Years		Work Years		Work Years		Work Years	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
FY 67	8027	7.6	15492	14.6	23536	22.2	696	0.7	1043	0.9	23475	22.2	33665	31.8	105,934	100
FY 68	10533	8.9	16765	14.1	25062	21.1	1003	0.8	1292	1.1	28573	24.0	35585	30.0	118,813	100
FY 69	12006	10.1	17086	14.3	22826	19.2	843	0.7	1774	1.5	29743	25.1	34591	29.1	118,869	100
FY 70	12921	10.2	18552	14.5	23126	18.2	742	0.6	2152	1.7	33229	25.9	36769	28.9	127,491	100
FY 71	13548	11.1	18911	15.5	20448	16.7	1076	0.9	2239	1.8	31831	26.1	34137	27.9	122,190	100
FY 72	12753	10.3	19654	15.8	18486	14.9	976	0.8	2596	2.1	36607	29.4	33214	26.7	124,286	100
FY 73	14157	11.9	18780	15.8	16696	14.1	805	0.7	2446	2.1	32916	27.7	33001	27.7	118,801	100
FY 74	14114	12.3	18838	16.5	12586	11.0	976	0.9	2273	2.0	35273	30.9	30226	26.4	114,286	100
FY 75	14393	12.3	19301	16.4	16143	13.7	1036	0.9	2334	2.0	33406	28.5	30761	26.2	117,374	100
FY 76	13793	12.2	19056	16.7	15193	13.3	1074	0.9	2764	2.4	31502	27.6	30632	26.9	114,014	100
FY 77	17483	14.3	19813	16.2	16684	13.6	4956	4.1	3365	2.8	30753	25.1	29244	23.9	122.298	100

Figure 17

ADP Work-Years by Activity



TOTAL ADP WORK-YEARS

ADPE SELECTION

SYSTEMS ANALYSIS & DESIGN

IN-HOUSE MAINTENANCE

PROGRAMMING

SERVICES & SUPPORT

KEY PUNCH / KEY VERIFY

EQUIPMENT OPERATIONS

Figure 18

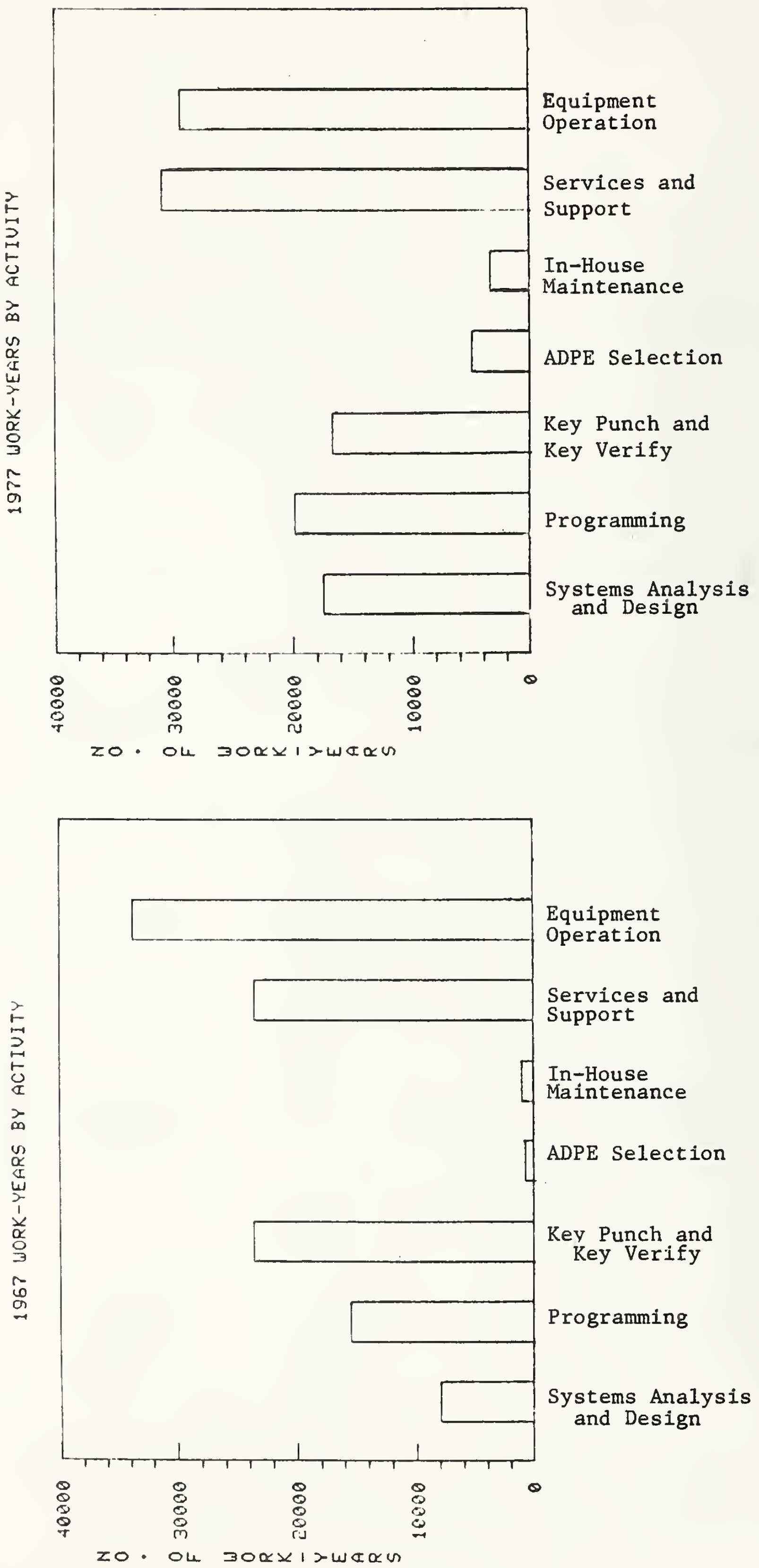

1977 WORK-YEARS BY ACTIVITY
Equipment Operation
Services and Support
In-House Maintenance
ADPE Selection
Key Punch and Key Verify
Programming
Systems Analysis and Design
40000
30000
20000
10000
0
NO. OF WORK-YEARS
1967 WORK-YEARS BY ACTIVITY
Equipment Operation
Services and Support
In-House Maintenance
ADPE Selection
Key Punch and Key Verify
Programming
Systems Analysis and Design
40000
30000
20000
10000
0
NO. OF WORK-YEARS

Figure 19

Key punch/key verify is a job activity which shows the largest decrease in number of work-years when compared with all of the other job activities. In FY67 there were 23536 work-years in the key punch/key verify activity and 16684 in FY77. This represents a decrease of 29 percent. Key punch/key verify represented about 22 percent of the total work-years in FY67 and in FY77 only represented less then 14 percent. Since current computer technology utilizes key punch/key verify tasks to a lesser degree than in the past, this trend of decreasing key punch/key verify activities should continue in the future.

The data available on the number of work-years in the ADPE selection activity seems inconsistent. From FY67 to FY76 ADPE selection showed an increase of 54 percent, 696 work-years to 1074 work-years. The FY77 figure, 4956 work-years, is over 300 percent higher than the FY76 figure and make the increase since FY67 show as an increase of 612 percent. This abrupt increase in the number of work-years is most clearly seen in the line graph, figure 18. In relation to the total number of work-years ADPE selection was less than 1 percent of the total from FY67 to FY76 and over 4 percent in FY77. It will be interesting to see if this number returns to the lower level of FY77 number of work-years or if it remains at this higher FY77 number.

The number of work-years for the in-house maintenance job activity has increased 223 percent from FY67 to FY77. In FY67 there were 1043 work-years for this activity and 3365 in FY77. In relation to the total number of work-years in-house maintenance increased from less then 1 percent in FY67 to almost 3 percent in FY77. This activity will probably continue to increase in the future but still remain a relatively small segment of the total number of work-years.

Overall, the figures show that the two job activities with the largest number of work-years are services and support and equipment operations. These two had the largest number of work-years in FY67 representing over 50 percent of the total and are still the largest in FY77 representing almost 50 percent of the total. Services and support had 23475 work-years in FY67 and 30753 in FY77 for an increase of 31 percent. This job activity represented over 22 percent in FY67 and over 25 percent in FY77. Equipment operations had 33665 work-years in FY67 and 29244 for a decrease of 13 percent. In relation to the total, equipment operations represented over 31 percent of the total work-years in FY67 and less then 24 percent in FY77. These two job activities, services and support and equipment operations, will probably remain the largest two activities for the next few years.

When all of the job activities are viewed together the total number of work-years has only increased 15 percent from the total FY67 number to the FY77 number. As figures 17 and 18 show the total number of work-years was higher in FY70 than it was in FY77. For comparison, figure 20 shows the costs for ADP personnel for this same time frame. The costs for ADP personnel have increased by 142 percent from FY67 to FY77. (The ADP costs have not been adjusted for inflation. They are not given in constant dollars.) Also for this same time period the number of general management computers has increased 60 percent. Thus the ADP costs and the number of computers for the general management category have increased much more than the number of work-years have increased.

The next part of this section is based on data that has recently been in GSA charts, "ADP Work-Years, by Agency - General Management Classification." Data was compiled for eleven fiscal years to show each agency's portion of the total number of work-years. Data is presented in figures 21 and 22 which show the number of work-years for each agency and the percentage of the total each agency represented for FY67 through FY77.

The agency with the largest number of ADP work-years in FY77 is DOD with approximately 55 percent of the total number. This is a decrease for DOD over these eleven fiscal years since in FY67 they had almost 66 percent of the total work-years. In FY77 Treasury was the agency having the next largest portion of the total with approximately 24 percent. This is an increase for Treasury over their FY67 figure of 15 percent of the total. Thus in FY77 two agencies, DOD and Treasury, represented over 75 percent of the total number of work-years. These agencies were also the two largest agencies for percentage of annual Federal ADP Costs, General Management Classification (see section "Analysis of Federal Computers and ADP Costs by Agency") representing approximately 68 percent of the total ADP costs.

ANNUAL COSTS FOR ADP - GENERAL MANAGEMENT CLASSIFICATION

(MILLIONS OF DOLLARS)

FISCAL YEAR	CAPITAL COSTS		OPERATING COSTS					TOTAL
	EQUIPMENT PURCHASE	SITE PREPARATION	EQUIPMENT RENTAL	PERSONNEL	CONTRACT SERVICES	SUPPORT PRODUCTS	OTHER	
1967	$114	$17	$270	$722	$194	$-	$128	$1445
1968	144	16	312	838	203	-	140	1653
1969	120	25	345	947	235	84	74	1830
1970	165	33	369	1099	280	85	94	2125
1971	252	17	451	1177	271	82	132	2382
1972	188	26	406	1267	335	83	122	2427
1973	237	29	430	1350	408	85	112	2651
1974	186	30	428	1372	415	98	133	2662
1975	246	22	466	1504	482	123	257	3100
1976	279	18	403	1666	506	114	202	3188
1977	377	24	425	1747	629	128	218	3548

Figure 20

NUMBER OF ADP WORK-YEARS, BY AGENCY GENERAL MANAGEMENT CLASSIFICATION

AGENCY	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77
Agri	1601	1431	1816	1850	1959	1789	1574	1732	1742	1541	2004
Comm	1597	1893	2004	2156	2381	2458	2373	2282	2520	2538	2536
DOD	69685	76518	76648	79687	75933	77289	68434	64462	61872	59638	67192
ERDA	3066	3492	3592	3764	3924	3727	3839	3686	3623	4278	4448
GSA	742	834	856	822	879	885	923	673	1096	1207	1161
HEW	5268	6208	5116	5227	5690	5217	5823	6189	7879	6118	4474
Int	613	710	911	1044	967	958	820	835	973	1104	1174
NASA	1249	1312	1345	1335	1256	1287	1659	1627	1534	1460	1396
Trans	882	972	989	1065	1064	1039	1042	1026	1072	1072	1083
Treas	15495	19440	19259	23442	22952	23715	25828	25585	28225	27745	29250
VA	1689	1755	1791	1866	1968	2054	2171	2057	2371	2571	2568
Other Civil	4047	4248	4542	5233	3217	3868	4315	4132	4467	4742	5012
TOTAL	105934	118813	118869	127491	122190	124286	118801	114286	117374	114014	122298

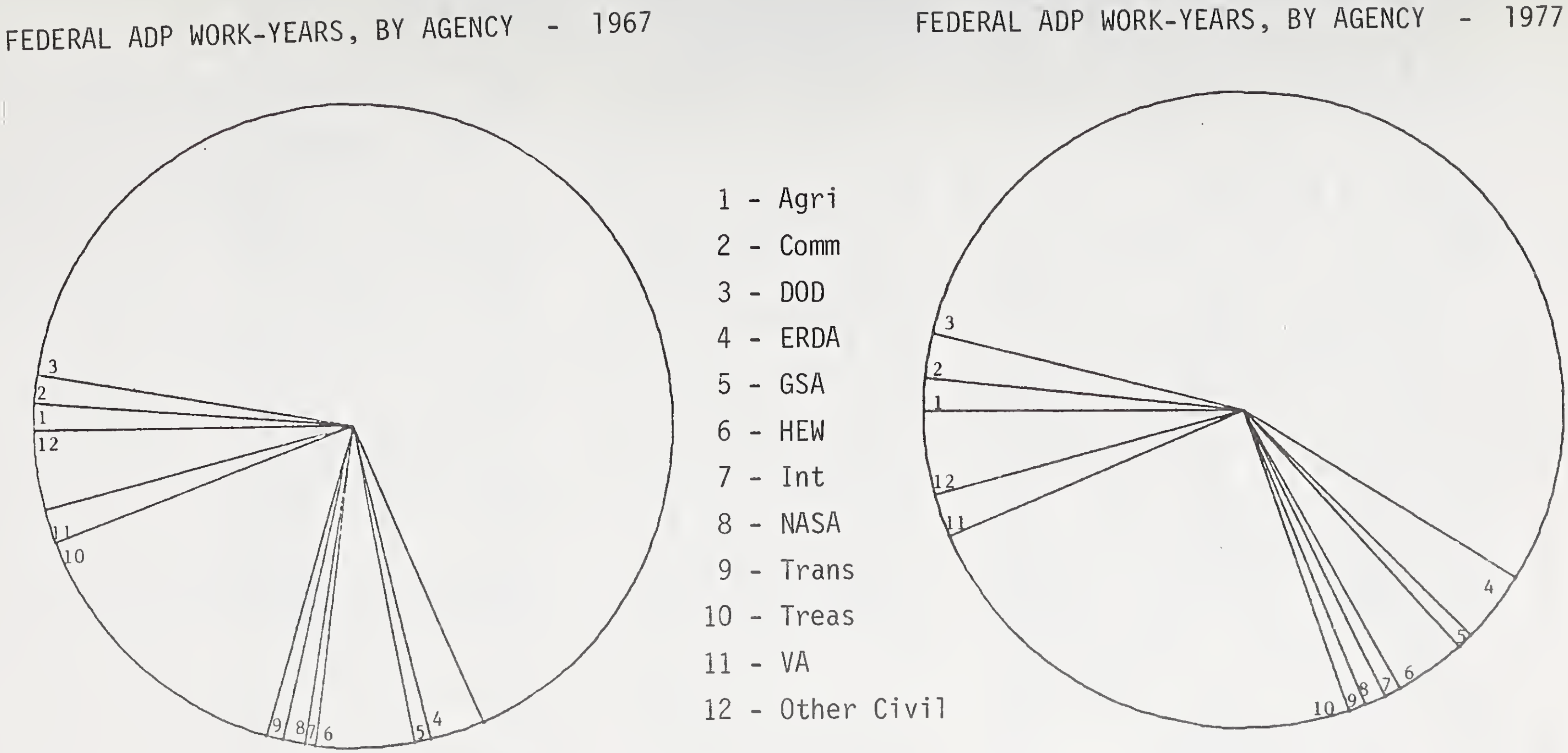
Figure 21

PERCENTAGE OF ADP WORK-YEARS, BY AGENCY
GENERAL MANAGEMENT CLASSIFICATION

AGENCY	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77
Agri	1.51	1.20	1.53	1.45	1.60	1.44	1.32	1.51	1.48	1.35	1.64
Comm	1.51	1.59	1.69	1.69	1.96	1.98	2.00	2.00	2.15	2.23	2.07
DOD	65.78	64.40	64.48	62.50	62.14	62.19	57.60	56.40	52.71	52.31	54.94
ERDA	2.89	2.94	3.02	2.95	3.21	3.00	3.23	3.23	3.09	3.75	3.64
GSA	.70	.70	.72	.65	.72	.71	.78	.59	.93	1.06	.95
HEW	4.97	5.23	4.30	4.10	4.66	4.20	4.90	5.41	6.71	5.37	3.66
Int	.58	.60	.77	.82	.79	.77	.69	.73	.83	.97	.96
NASA	1.18	1.10	1.13	1.05	1.03	1.03	1.40	1.42	1.31	1.28	1.14
Trans	.83	.82	.83	.84	.87	.84	.88	.90	.91	.94	.88
Treas	14.63	16.36	16.20	18.39	18.78	19.08	21.74	22.39	24.05	24.33	23.92
VA	1.59	1.48	1.51	1.46	1.61	1.65	1.83	1.80	2.02	2.25	2.10
Other Civil	3.83	3.58	3.82	4.10	2.63	3.11	3.63	3.62	3.81	4.16	4.10
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Figure 22

All of the remaining civilian agencies represent the other 25 percent of the total work-years. None of these agencies separately represent 5 percent of the total. Figure 23 shows, in pie chart form, the percentages of total ADP work-years, general management classification, for each agency in FY67 and FY77. Since the total work-years have not changed dramatically over these eleven fiscal years, none of the agencies show tremendous changes. The increase of Treasury and the decrease of DOD are the most noticable changes.


FEDERAL ADP WORK-YEARS, BY AGENCY - 1967

FEDERAL ADP WORK-YEARS, BY AGENCY - 1977

Figure 23

VI. Calendar Year Data

A. Federal Government Computers

To facilitate comparisons of Federal and U.S. computers and for a more detailed analysis than used in the previous report ("Computers in the Federal Government: A Compilation of Statistics", NBS SP-500-7, June 1977), a model-by-model census of Federal computers was developed. As mentioned earlier in this report, the census was developed by comparing IDC's model-by-model census with computer printouts obtained from GSA of Federal computers for year-end 1972-1977. Where the computer was not listed in the IDC census we made a judgment of the appropriate category and size. Some of the CPU model numbers were deleted from the GSA listings for purposes of our analysis because, in our judgment, they could not be classified as computers. Some examples of these deleted items are add-on memory units, programmable calculators and intelligent terminals. Since both censuses were based on year-end data no extrapolation of data was necessary for comparison.

Figures 24, 25 and 26 show the totals from the census. The largest growth area in the Federal Government by number of computers is the minicomputers category. The general purpose computers are declining in number and percentage and now represent less then 30 percent of the Federal computers, from a high of 56 percent in 1972. By comparison, in 1972 minicomputers were 27 percent of total Federal computers and are 55 percent in 1977. The special computers have remained relatively constant by number over these years. They represented 17 percent of the Federal computers in 1972, 1973, 1974 and 1975 and in 1977 represent 15 percent.

Figure 27 shows the average growth rate for Federal computers by number for calendar year totals. These growth rate figures are not affected by a transitional quarter and therefore should be more accurate growth rate figures. According to these year-end figures the Federal Government is currently adding an average of 868 computers to the inventory each year, for an average growth rate of over 10 percent. 1977 showed a very large increase, adding almost 1500 computers for a growth rate of over 15 percent. If the average growth rate of 10.43 percent is projected forward in time there would be an estimated 15,000 computers in the

COMPUTERS IN THE FEDERAL GOVERNMENT BY CATEGORY AND SIZE

	Calendar Year					
Size and Category	1972	1973	1974	1975	1976	1977
General Purpose						
Size Class 1	52	42	28	21	13	6
2	1135	1027	889	886	755	720
3	973	957	872	811	720	711
4	888	927	909	811	804	790
5	328	363	342	348	337	364
6	308	353	393	398	403	440
7	141	176	221	223	253	277
Total General Purpose	3825	3845	3654	3498	3285	3308
Minicomputers	1804	2256	3050	3848	4791	6096
Special	1159	1227	1364	1482	1587	1728
Total	6788	7328	8068	8828	9663	11,132

Figure 24

COMPUTERS IN THE FEDERAL GOVERNMENT BY CATEGORY

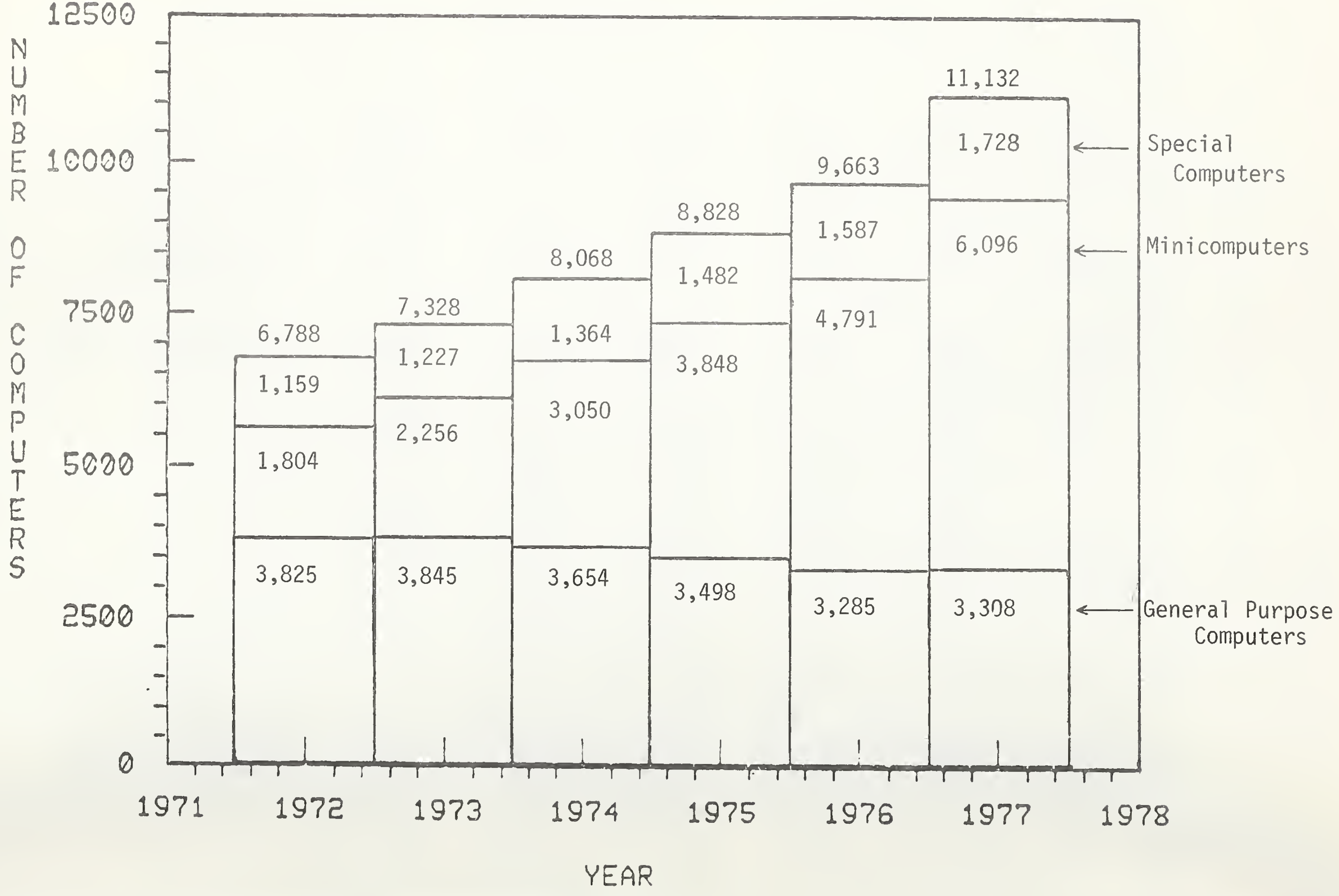


FIGURE 25

COMPUTERS IN THE FEDERAL GOVERNMENT BY CATEGORY

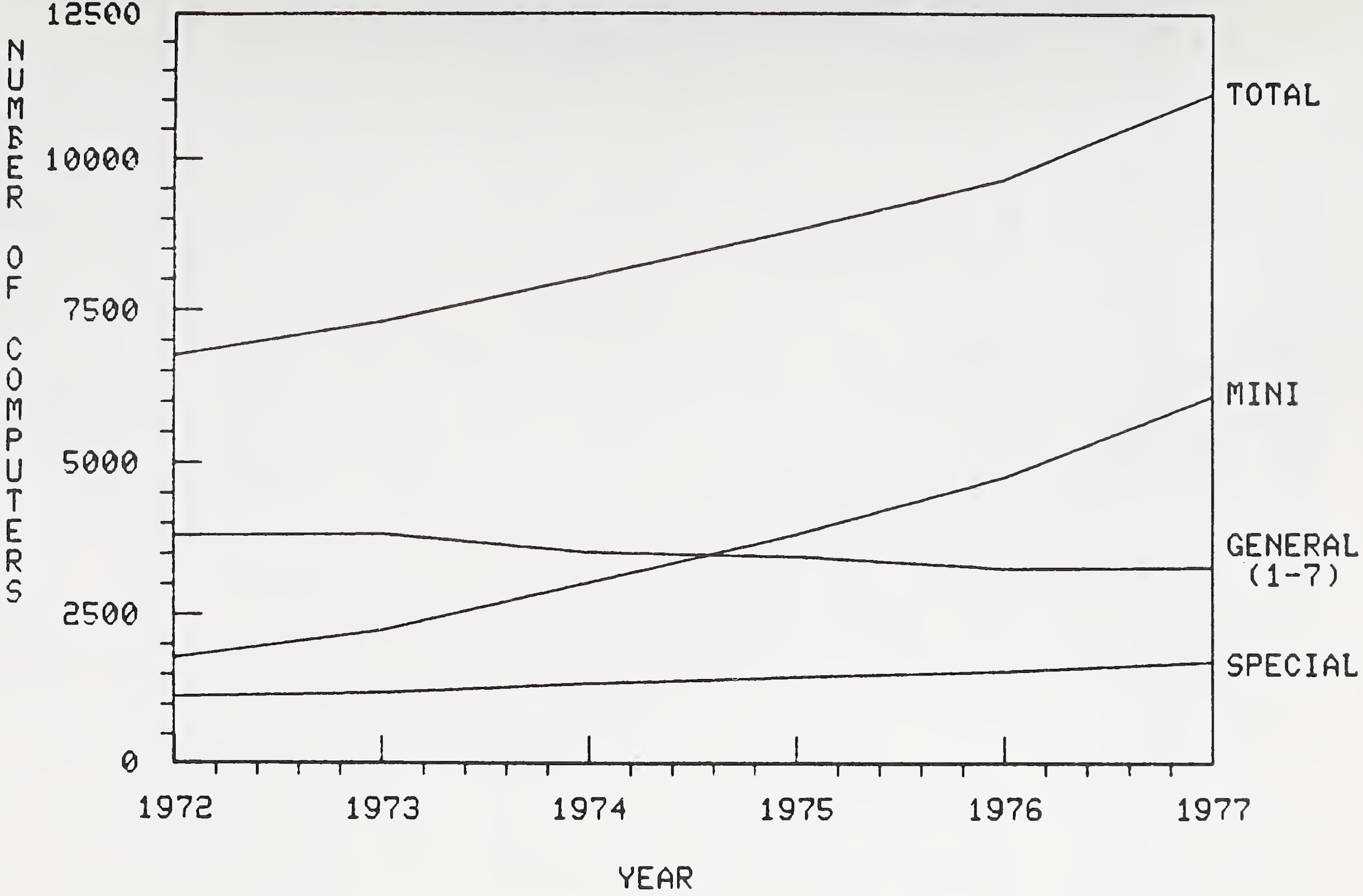


FIGURE 26

FEDERAL GROWTH RATE BY NUMBER

Year End	Number of CPUs	Number Added	Growth %
1972	6,788		
		540	7.96
1973	7,328		
		740	10.10
1974	8,068		
		760	9.42
1975	8,828		
		835	9.46
1976	9,663		
		1,469	15.20
1977	11,132		
	Average	868.8	10.43

Figure 27

Federal Government by 1980. This projected figure, however, may be a conservative one.

B. United States Computers

The U.S. computer data by calendar year presented in Figures 28, 29, 30 and 31 represent the majority of the U.S. data used throughout this report. The figures are based on data presented in IDC's "EDP Industry Report," Annual Review and Forecast issue, April 22, 1977, "EDP Industry Report," Annual Review and Forecast issue, May 19, 1978, and data provided by IDC in answer to special requests.

Figures 28 and 29 show the totals of the IDC data (restructured to eliminate the category of small business computers) for year-end 1972-1977. These figures show that the number of computers in the U.S. has tripled from 1972 to 1977 with minicomputers showing the largest growth by number. The number of minicomputers in 1977 is more than five times the number of minicomputers that were installed in the U.S. in 1972. The number of general purpose computers has not varied significantly over the last six years. However, general purpose computers represented 48 percent of the U.S. installed base in 1972 and in 1977 represented only 18 percent by number. Minicomputers represented 40 percent of the U.S. installed base in 1972 and now represent 66 percent. The portion of the U.S. computers in the special computer category which include, for example, some small business machines, communication processors, data entry and process control computers, has had minimal change over the six year period. The special category represented 12 percent of the U.S. computers in 1972 and 16 percent in 1977. The number of special computers has, however, quadrupled from 1972 to 1977.

Figure 29 also shows the number of computers in each of the size classes in the general purpose category. An analysis of each one of the size classes is presented in later sections. Figure 30 is a line graph of the totals from figure 29 to highlight which segments of the U.S. installed base are increasing by number at the largest rate. It is evident from this line graph that the increase in minicomputers has greatly influenced the total increase in numbers of U.S. computers. The curve for minicomputers is similar to the curve for total computer systems. This line graph also shows that the general purpose category as a

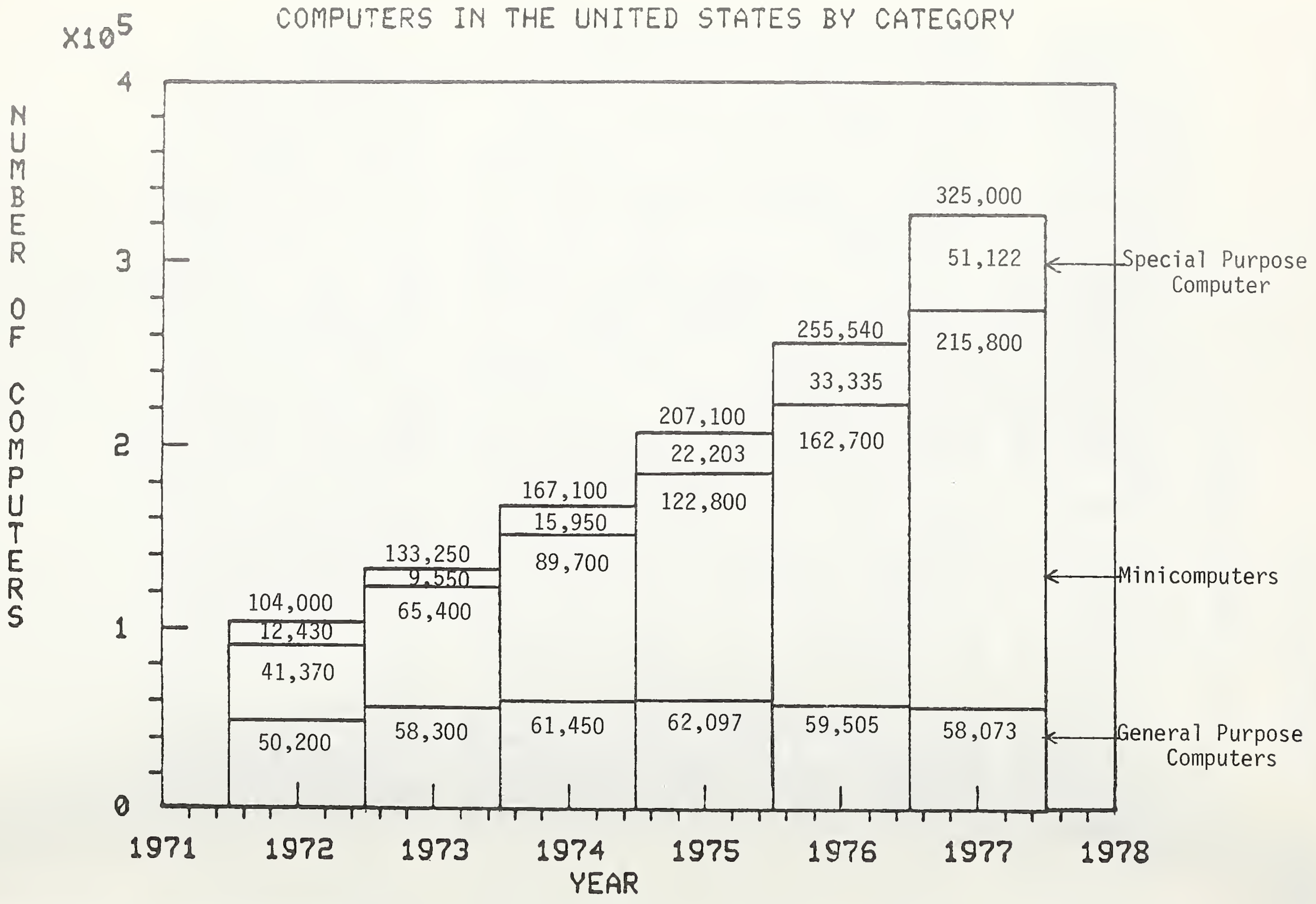

COMPUTERS IN THE UNITED STATES BY CATEGORY
X10^5
NUMBER OF COMPUTERS
0
1
2
3
4
YEAR
1971
1972
1973
1974
1975
1976
1977
1978
104,000
12,430
41,370
50,200
133,250
9,550
65,400
58,300
167,100
15,950
89,700
61,450
207,100
22,203
122,800
62,097
255,540
33,335
162,700
59,505
325,000
51,122
215,800
58,073
Special Purpose Computer
Minicomputers
General Purpose Computers

Figure 28

COMPUTER IN THE UNITED STATES BY CATEGORY AND SIZE

	Calendar Year					
Size and Category	1972	1973	1974	1975	1976	1977
General Purpose						
Size Class 2	23,594	27,110	28,636	28,704	24,726	20,832
3	11,345	13,234	12,720	13,214	14,905	16,579
4	9,488	11,077	12,474	12,334	11,639	11,461
5	3,213	3,790	4,179	4,022	4,037	4,674
6	2,209	2,623	2,704	2,957	3,191	3,354
7	351	466	737	866	1,007	1,178
Total General Purpose	50,200	58,300	61,450	62,097	59,505	58,078
Minicomputers	41,370	65,400	89,700	122,800	162,700	215,800
Special	12,430	9,550	15,950	22,203	33,335	51,122
Total	104,000	133,250	167,100	207,100	255,540	325,000

Figure 29

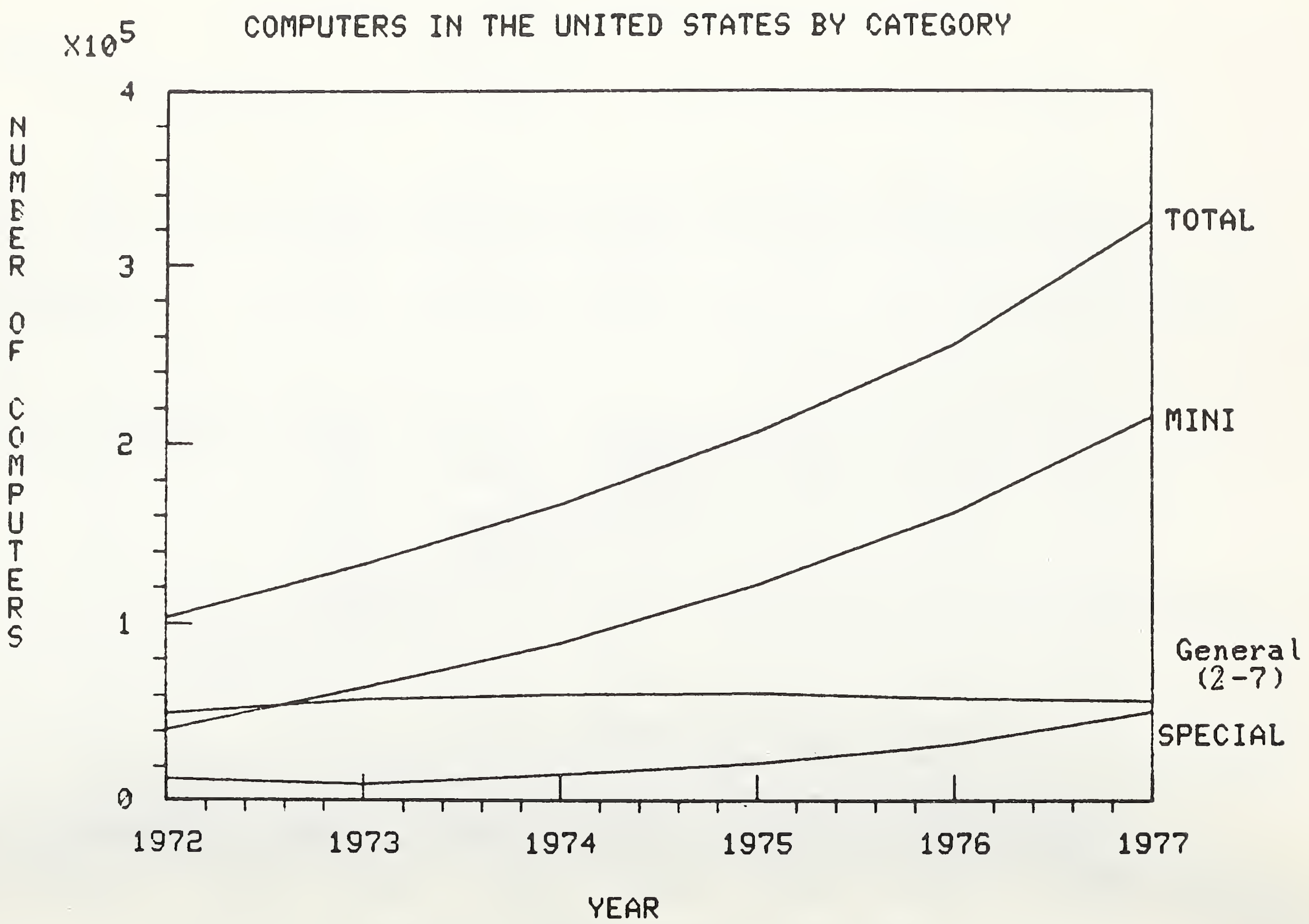

COMPUTERS IN THE UNITED STATES BY CATEGORY
X10^5
NUMBER OF COMPUTERS
4
3
2
1
0
1972
1973
1974
1975
1976
1977
YEAR
TOTAL
MINI
General (2-7)
SPECIAL

FIGURE 30

GROWTH RATE OF UNITED STATES COMPUTERS BY NUMBER

Year End	Number of CPUs	Number Added	Growth (%)
1972	104,000		
		29,250	28.13
1973	133,250		
		33,850	25.40
1974	167,100		
		40,000	23.94
1975	207,100		
		48,440	23.39
1976	255,540		
		69,460	27.18
1977	325,000		
	Average	44,200	25.61

Figure 31

whole does not show much change over the last few years while special computers have increased slightly.

Figure 31 shows the U.S. growth rate by year for the total number of computers in the U.S. For the last six years there has been an average of 44,200 computers added to the installed base each year for a growth rate of over 25 percent. If this growth rate was projected forward in time to 1980 there would be an estimated 634,765 computers in the U.S. In the "EDP Industry Report," Annual Review and Forecast issue, May 19, 1978, IDC projects that by 1980 there will be 677,400 computers. Thus this average growth rate of 25 percent seems a realistic, perhaps conservative, growth rate for the next few years.

C. Federal Government Computers Compared With United States Computers

When the total number of Federal computers is compared with the total number of U.S. computers, the Federal portion of the U.S. installed base appears quite small. Figure 32 displays these totals. By number, the Federal portion of the U.S. installed base was over 6 percent in 1972 and less than 4 percent in 1976 and 1977. That is, the number of U.S. computers is increasing at a greater rate than the number of Federal computers.

1. General Purpose Computers

The definitions for general purpose computers and the size classes in this category were given in Section III. In summary, size class 2 contains the smallest and generally least expensive of the general purpose computers and size class 7, the largest and generally most expensive of the general purpose computers.

Figure 33 shows the numbers of general purpose computers in the various size classes, for both the U.S. and Federal Government. It is interesting to note that the computer size classes seem to fall into two groups, 2, 3, and 4 in one group and 5, 6, and 7 in the other for both the U.S. and the Federal Government computers. The larger Federal computers, i.e. size classes 5, 6, and 7, represent a stable influence on the Federal inventory. These large computers represented 21 percent of the general purpose computers in 1972 and 32 percent in 1977. Since these

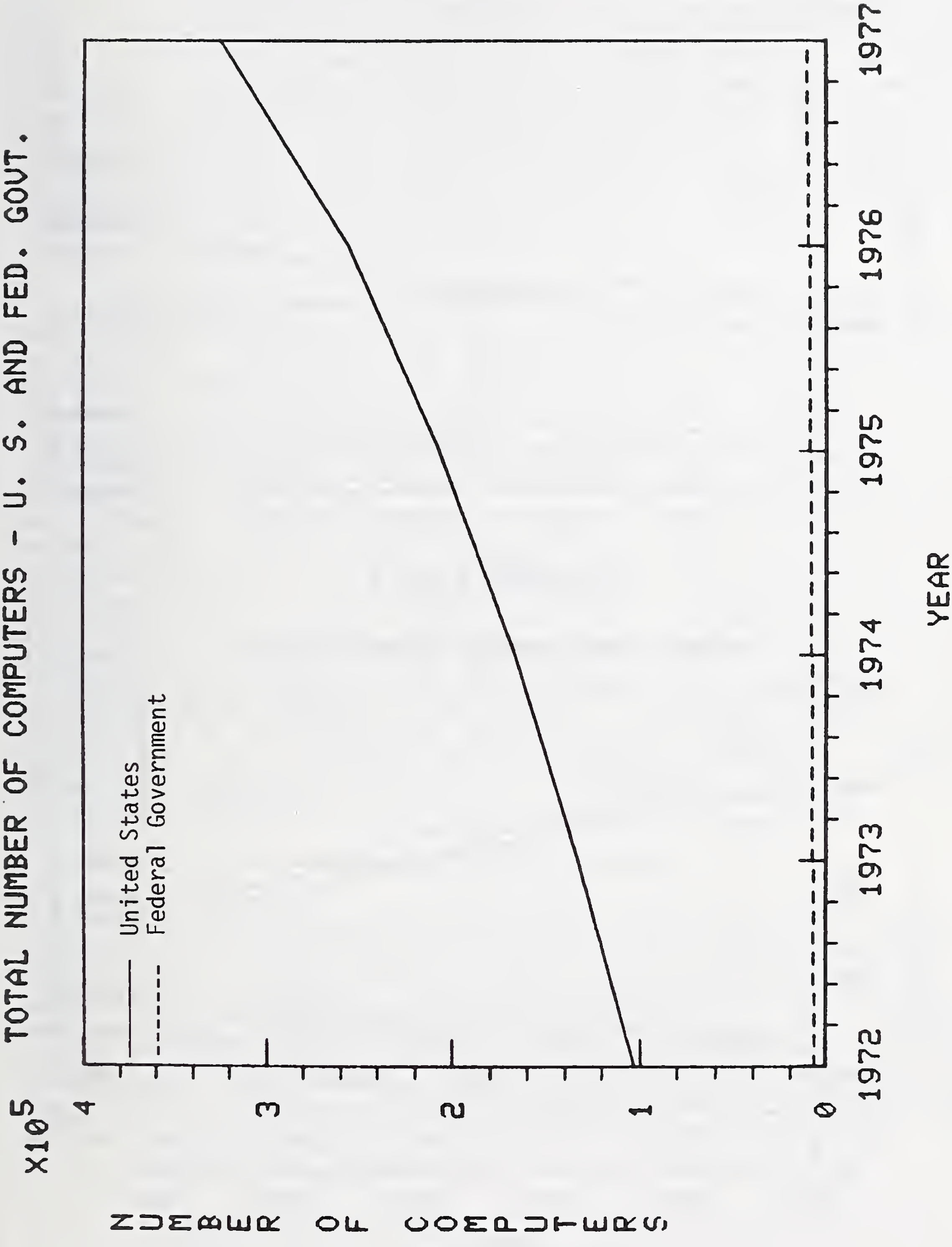
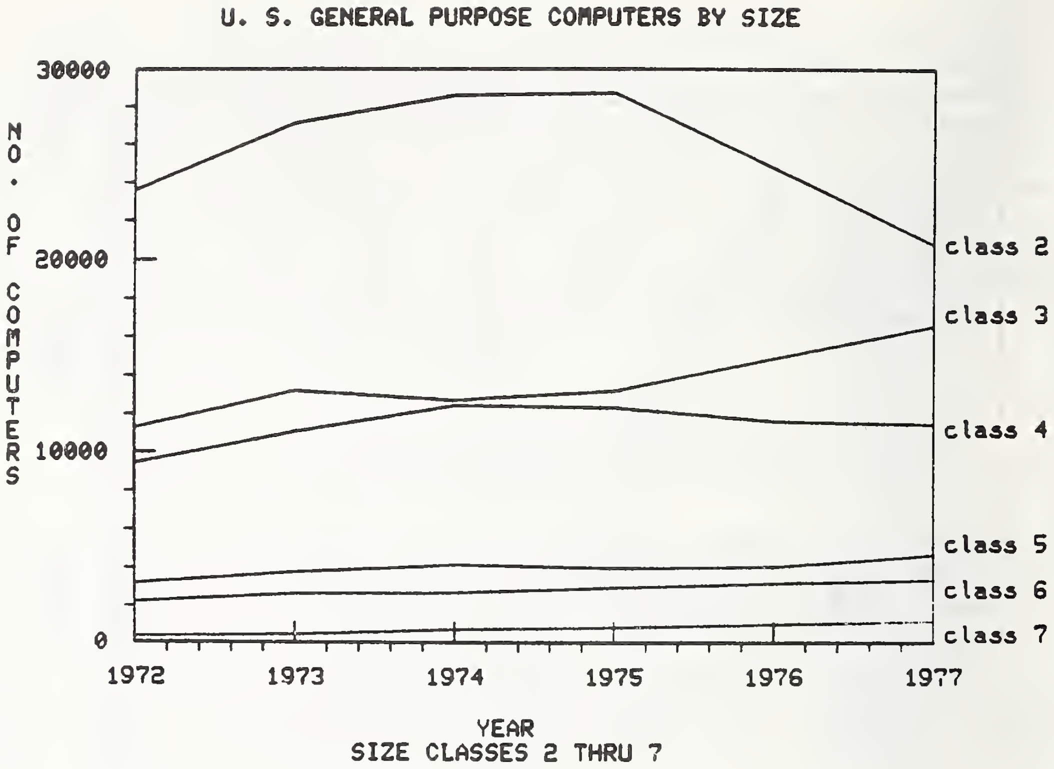

TOTAL NUMBER OF COMPUTERS - U. S. AND FED. GOVT.
United States
Federal Government
X10^5
4
3
2
1
0
NUMBER OF COMPUTERS
1972
1973
1974
1975
1976
1977
YEAR

FIGURE 32


U. S. GENERAL PURPOSE COMPUTERS BY SIZE

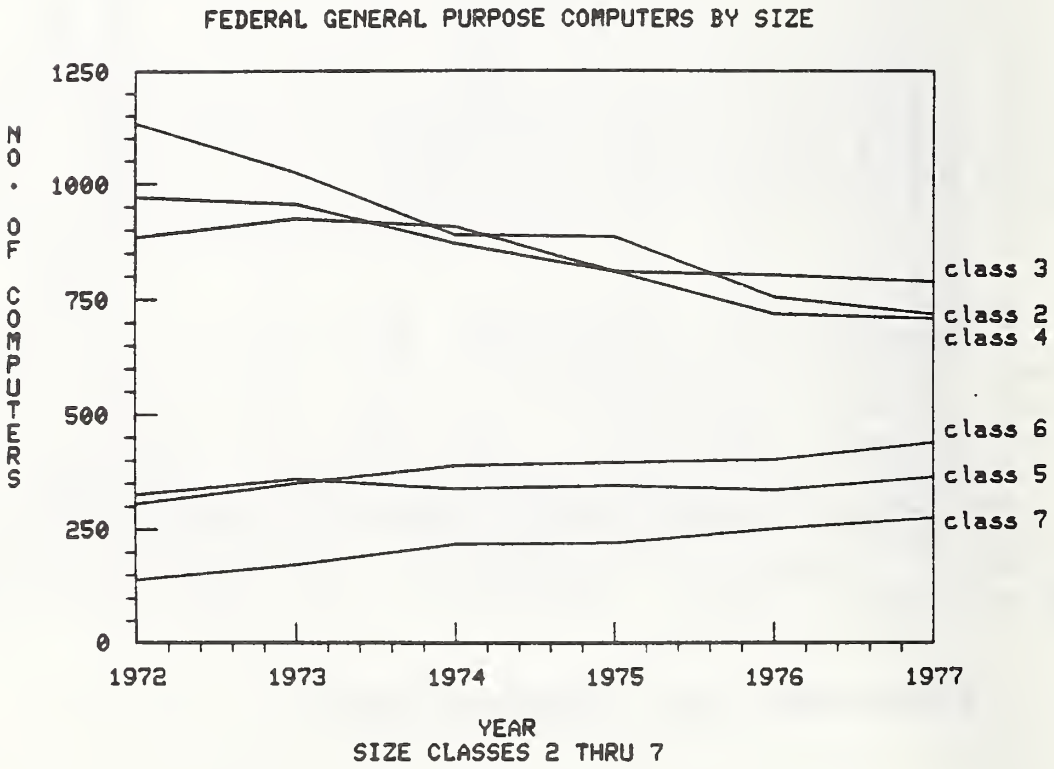

FEDERAL GENERAL PURPOSE COMPUTERS BY SIZE

Figure 33

computers are the most expensive, they exert a large influence on the dollar value of Federal computers. The same observations may be made for the U.S. size classes 5, 6 and 7. This group of computers represented 11 percent of the U.S. general purpose segment in 1972 and 16 percent in 1977. Size classes 2, 3, and 4 for both the U.S. and the Federal Government fluctuate more than the other three size classes. As a group these are less expensive machines and are usually the entry level machines for an installation. However, by number these machines represent the largest part of the general purpose computers. Size classes 2, 3, and 4 represented 84 percent of the U.S. general purpose computers in 1977 and 68 percent of the Federal general purpose computers.

The growth rates of total general purpose computers and the growth rates of each of the size classes were calculated. This data is presented in figure 34. The average compound growth rate of all Federal general purpose computers is a negative 3 percent while the average growth rate for the U.S. Computers is a positive 3 percent. Thus the general purpose segment as a whole is not significantly changing. However, when each size class is analyzed seperately, it becomes apparent that there are different growth patterns for the various size classes in the general purpose segment. The largest growth rate of any of the size classes for both the Federal and U.S. computer systems is for size class 7, the largest and most expensive computer systems. For both the Federal and U.S. computers, the larger size classes, 5, 6, and 7 show a much larger growth rate than size classes 2, 3, and 4. The growth rate of each size class is discussed in the following sections. Please note that the figures in the following sections, figures 35-41 and figure 43, utilize a logarithmic scale for the number of computers.

a. Size Class 1 Computers

Since size class 1 is used only for Federal computers, there is no graph comparing Federal vs. U.S. size class 1 computers. In Figure 24 the raw data for size class 1 computers is presented. In 1972 there were 52 old computers representing approximately 1 percent of the Federal computers by number and in 1977 there were 6 computers remaining, representing .005 percent of the Federal computers. These historical machines are a miniscule part of the Federal computers and should probably disappear from

GROWTH RATE OF GENERAL PURPOSE COMPUTERS

All General Purpose Computers

	Federal			U.S.		
Year End	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)
1972	3,825	20	-1%	50,200	8,100	16%
1973	3,845	-191	-5%	58,300	3,150	5%
1974	3,654	-156	-4%	61,450	647	1%
1975	3,498	-213	-6%	62,097	-2,592	-4%
1976	3,285	23	1%	59,505	-1,427	-2%
1977	3,308			58,078		
	Average	-103.4	-3%	Average	1575.6	3%

SIZE CLASS 1

Year End	No. of CPU's	No. Added	Growth(%)
1972	52	-10	-19
1973	42	-14	-33
1974	28	-7	-25
1975	21	-8	-38
1976	13	-7	-54
1977	6		
	Average	-9.2	-34

Figure 34a

SIZE CLASS 2

	Federal			U.S.		
Year End	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)
1972	1,135	-108	-10	23,594	3,516	15
1973	1,027	-138	-13	27,110	1,526	6
1974	889	-3	-.3	28,636	68	.2
1975	886	-131	-15	28,704	-3,978	-14
1976	755	-35	-5	24,726	-3,894	-16
1977	720			20,832		
	Average	-83	-9	Average	-552.4	-2

SIZE CLASS 3

	Federal			U.S.		
Year End	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)
1972	973	-16	-2	11,345	1,889	17
1973	957	-85	-9	13,234	-514	-4
1974	872	-61	-7	12,720	494	4
1975	811	-91	-11	13,214	1,691	13
1976	720	-9	-1	14,905	1,674	11
1977	711			16,579		
	Average	-52	-6	Average	1,046.88	8

SIZE CLASS 4

	Federal			U.S.		
Year End	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)
1972	888	39	4	9,488	1,589	17
1973	927	-18	-2	11,077	1,397	13
1974	909	-98	-11	12,474	-140	-1
1975	811	-7	-1	12,334	-695	-6
1976	804	-14	-2	11,639	-178	-2
1977	790			11,461		
	Average	-19.6	-2	Average	394.6	4

Figure 34b

SIZE CLASS 5

	Federal			U.S.		
Year End	No. of CPU's	No. Added	Growth(%)	No. of CPU's	No. Added	Growth(%)
1972	328	35	11	3,213	577	18
1973	363	-21	-6	3,790	389	10
1974	342	6	2	4,179	-157	-4
1975	348	-11	-3	4,022	15	.4
1976	337	27	8	4,037	637	16
1977	364			4,674		
	Average	7.2	2	Average	584.4	8

SIZE CLASS 6

1972	308	45	15	2,209	414	19
1973	353	40	11	2,623	81	3
1974	393	5	1	2,704	253	9
1975	398	5	1	2,957	234	8
1976	403	37	9	3,191	163	5
1977	440			3,354		
	Average	26.4	7	Average	229	9

SIZE CLASS 7

1972	141	35	25	351	115	33
1973	176	45	26	466	271	58
1974	221	2	1	737	129	18
1975	223	30	14	866	141	16
1976	253	24	10	1,007	171	17
1977	277			1,178		
	Average	27.2	15	Average	165.2	28

Figure 34c

the inventory lists in the next couple of years.

b. Size Class 2 Computers

Figure 35 shows the number of size class 2 computers in the Federal Government and the U.S. The Federal size class 2 computers have decreased from 1135 in 1972 to 720 in 1977 (see figure 24). The U.S. size class 2 computers increased from 23,594 computers in 1972 to 28,704 in 1975 and then decreased to 20,832 in 1977 (see figure 29).

Experts at IDC have a number of theories for the fluctuations in the number of size 2 computers. They believe that U.S. size 2 computers have a large leased base and are therefore more easily upgraded to other systems, size class 3 or higher. Since these size 2 computers are often considered entry level machines, IDC theorizes that once the small computer systems are implemented, businesses realize that they can use computers for additional tasks and obtain larger machines. Since computers have made inroads into almost all segments of industry, most businesses are now aware of the uses of computers and are obtaining larger systems to begin with.

Since the Federal Government leases 9 percent of all Federal computers and leases only 7 percent of the computers costing $50,000 or less, the owned vs. leased theory for the fluctuation in size class 2 computers does not seem relevant. The rest of the theories may, however, be appropriate. Federal size class 2 computers represented 17 percent of all Federal computers in 1972 and represented only about 6 percent in 1977. They represented 30 percent of the general purpose computers in 1972 and 22 percent in 1977. Either the computer users are upgrading these systems, using minicomputers for the same application, or the number of applications appropriate for this size computer are diminishing. With the data now available there is no way to accurately describe the reasons for these fluctuations. It is evident, however, that size class 2 computers are decreasing in the Federal Government with a negative growth rate of almost 9 percent. Since U.S. size class 2 computers represented 23 percent of the U.S. installed base in 1972 and represented only 6 percent in 1977, their role in the total U.S. computers seems to be decreasing also. These computers represented 47 percent of the general purpose computers in 1972 and 36 percent in 1977. It is interesting to note that both the Federal and

SIZE CLASS 2 COMPUTERS

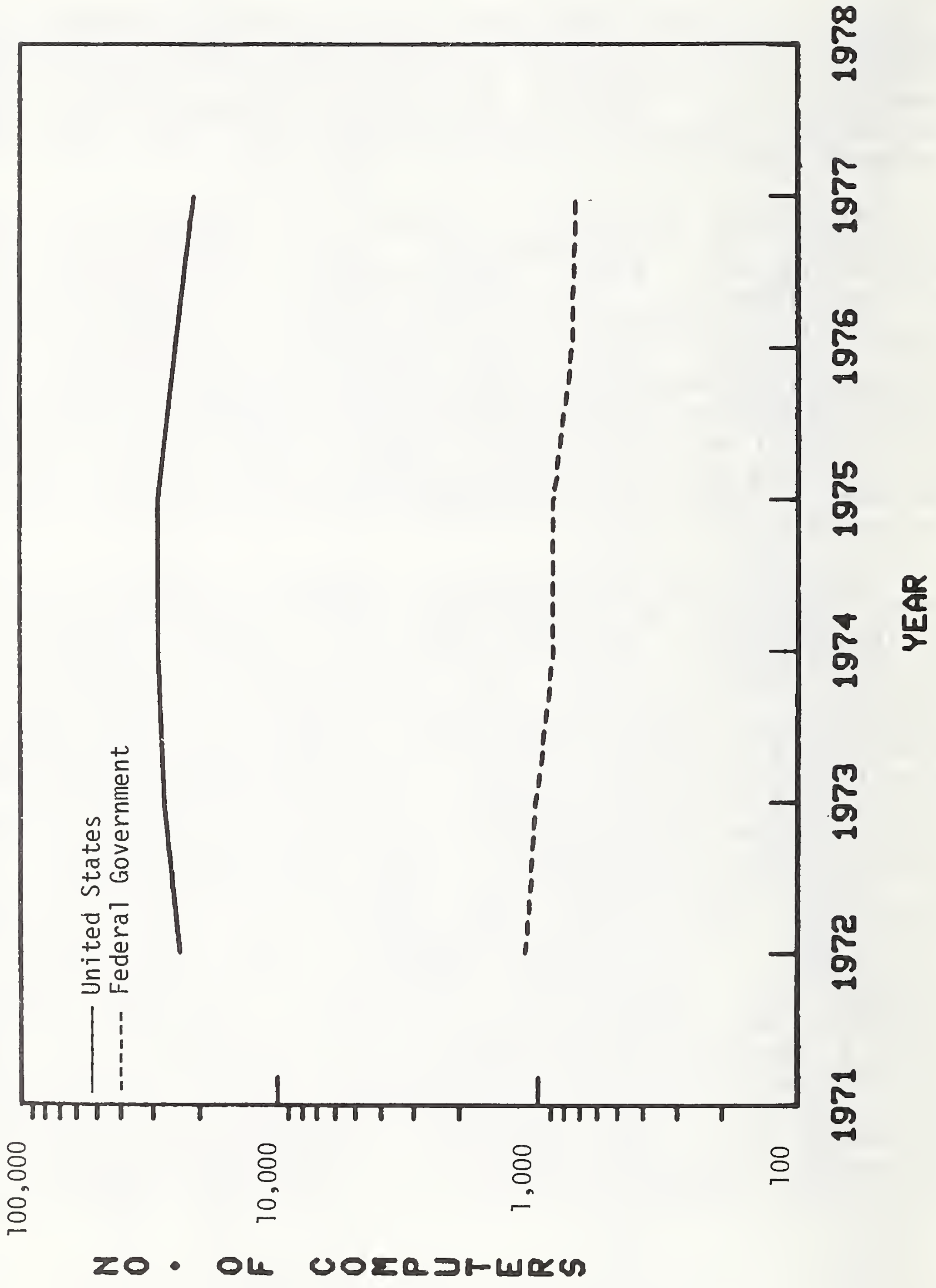


FIGURE 35

the U.S. size class 2 computers represent 6 percent (in 1977) of their respective total number of computers.

The portion of Federal size class 2 computers in the U.S. size class 2 category has not changed significantly over the last six years. In 1972 the Federal size class 2 computers represented almost 5 percent of the number of U.S. size class 2 computers while in 1977 these computers were approximately 3 percent of the U.S. computers. One reason for this decrease is that the U.S. size class 2 computers are only at an average rate of 2 percent while the Federal computers have a negative growth rate of 9 percent. Thus the portion of Federal size class 2 computers in the U.S. size class 2 category has diminished.

In summary the Federal computers in size class 2 and the U.S. computers in size class 2 are decreasing by number. They still represent a fairly large segment of the general purpose computers, 36 percent for the U.S. in 1977 and 22 percent of the Federal computers in 1977, but since they are the least expensive of all of the general purpose equipment, their influence on the dollar value of the general purpose segment is not that extensive.

c. Size Class 3 Computers

Figure 36 shows the number of Federal and U.S. size class 3 computers. The number of Federal computers in this size class has decreased from 972 in 1972 to 711 in 1977 for an average negative growth rate of 6 percent. The portion of total Federal computers represented by these size class 3 computers has decreased from 14 percent in 1972 to 6 percent in 1977. For this same time period the U.S. size class 3 computers have increased from 11,345 to 16,579 for an average growth rate of 8 percent. However, the portion of the total U.S. computers represented by this size class has dropped from 11 percent in 1972 to 5 percent in 1977. Thus the number of U.S. size class 3 computers is growing but growing at a slower rate than the rest of the U.S. computer population.

When we analyze these computers compared with the rest of the general purpose computers, we get a much different view of the trends of this size class. In the Federal Government size class 3 computers represented 25 percent of the general purpose computer segment in 1972 and almost 22 percent in 1977. In the U.S. size class 3 computers

SIZE CLASS 3 COMPUTERS

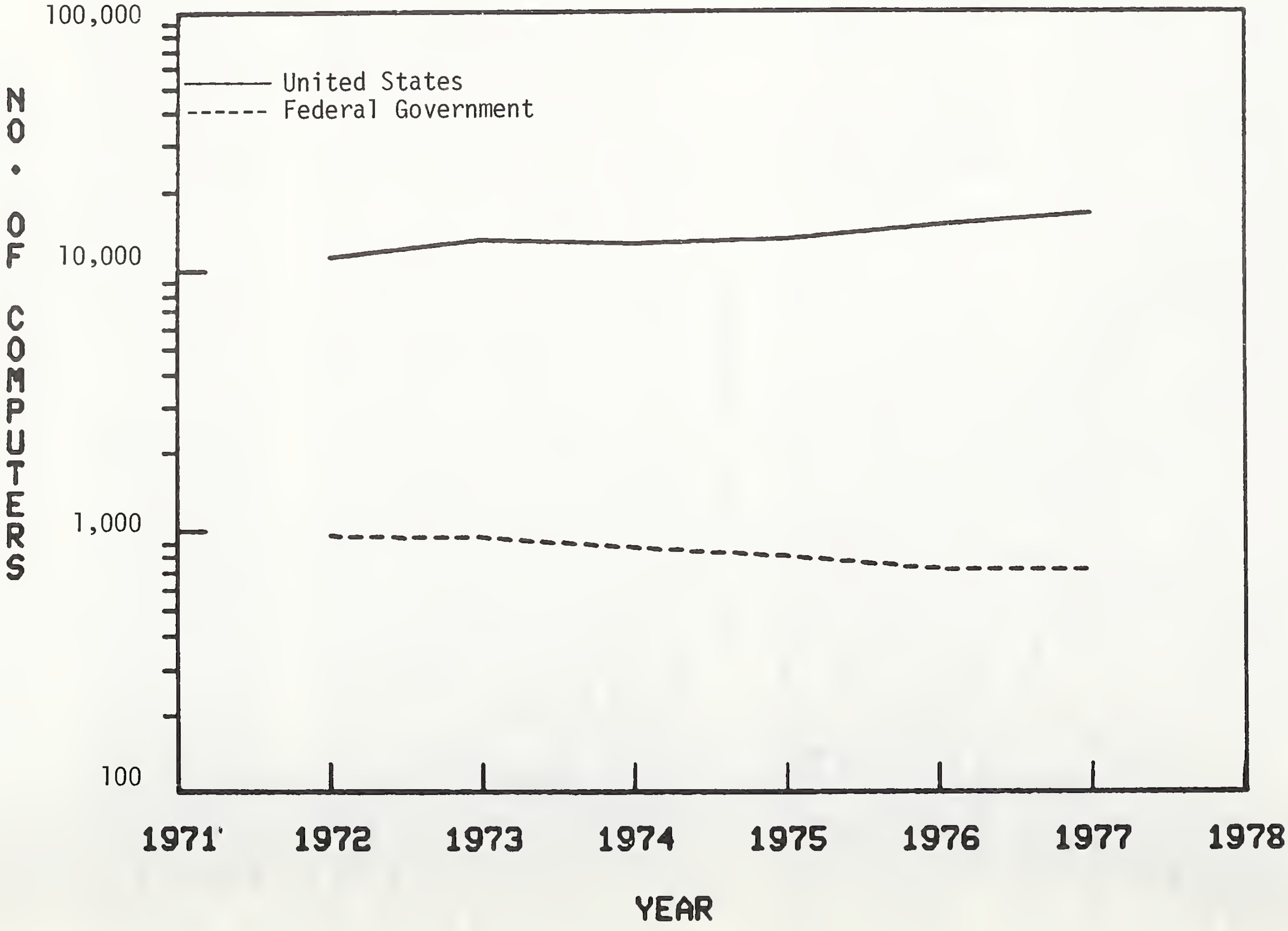


FIGURE 36

increased from 23 percent of the general purpose computers in 1972 and 29 percent in 1977. Thus the U.S. size class 3 computers are increasing both in numbers and in the percent of the general purpose computers. Of all the computer size classes in the general purpose segment of the U.S. installed base, this size class shows the largest percent increase. In the Federal Government, size class 3 shows the second largest decrease with size class 2 showing the largest.

The Federal portion of the U.S. size class 3 computers has also decreased over these years. In 1972 the Federal size class 3 computers represented almost 9 percent of the U.S. size class 3 computers and only 4 percent in 1977. Thus the Federal size class 3 computers seem to be showing the growth trends opposite those of the U.S. At this time we have no sound explanations for this occurrence.

d. Size Class 4 Computers

Figure 37 shows the number of size class 4 computers in the U.S. and Federal Government. In the U.S. the number of size class 4 computers has increased from 9,488 in 1972 to 11,461 in 1977, for an average compound growth rate of 4 percent. At the same time the Federal size class 4 computers have decreased from 888 to 790, for an average negative growth rate of 2 percent. Both the number of U.S. and Federal computers increased during these years and then decreased to their 1977 level. Both curves seem to be leveling off and appear to show a very gradual decline.

In 1972 the Federal size class 4 computers represented 13 percent of the total Federal computers and 23 percent of the general purpose computers. In 1977 these computers represented 4 percent of the total computers and 24 percent of the general purpose computers. Thus the portion of Federal size class 4 computers in the general purpose segment has not really changed significantly in this six year time frame. For the U.S. installed base, size class 4 computers represented 9 percent of the total computers and 19 percent of the general purpose segment. In 1977 these computers represented 4 percent of the total and 20 percent of the general purpose segment. Thus in the U.S. also the portion of size class 4 computers in the general purpose segment for this time frame has remained relatively unchanged. The decrease in percent of the total Federal and U.S. computers is mainly reflective of the decrease in the

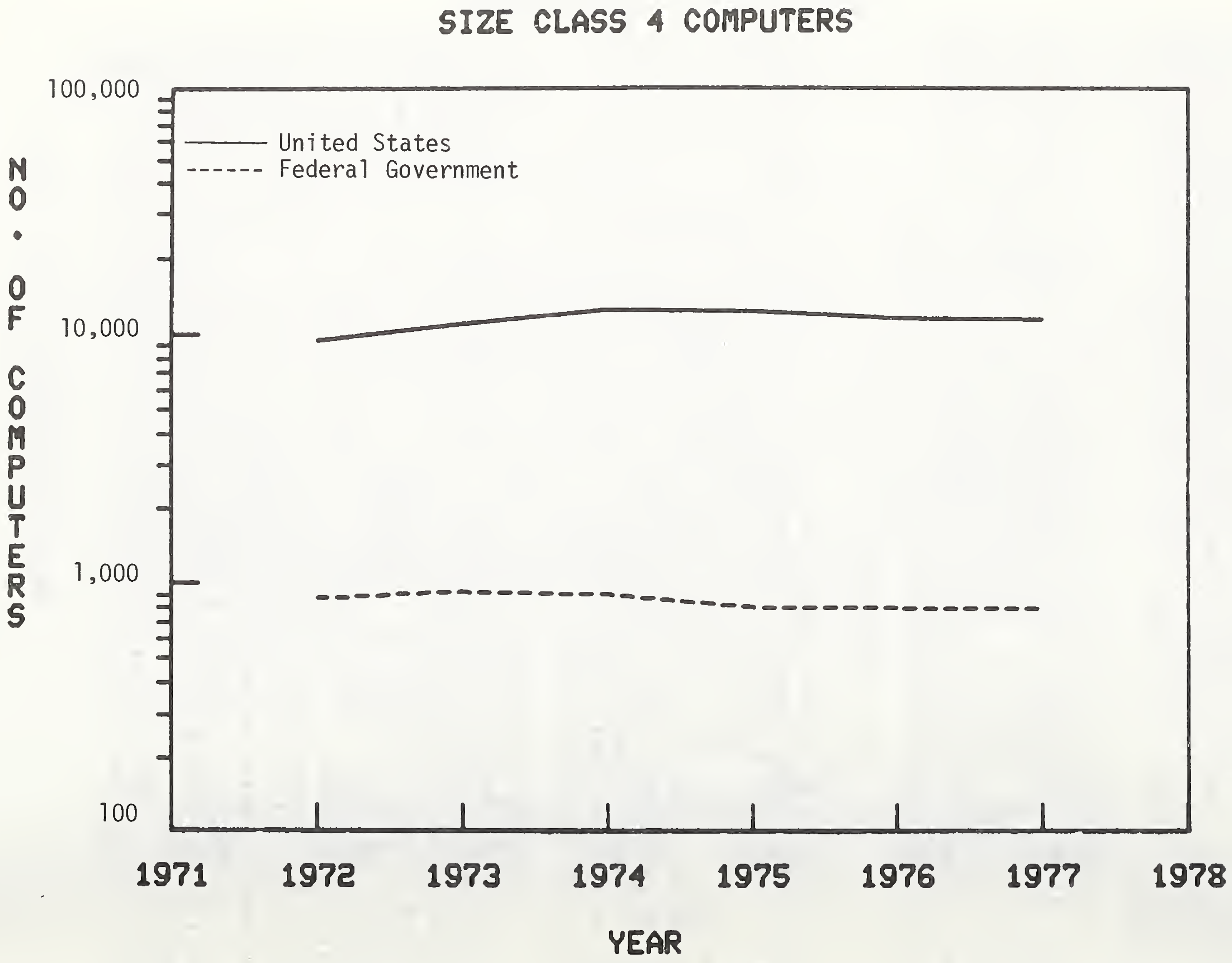

SIZE CLASS 4 COMPUTERS

FIGURE 37

general purpose segment of the totals.

The Federal portion of the U.S. installed base of size class 4 computers has not changed drastically over these years. In 1972 the Federal size class 4 computers represented 9 percent of the U.S. size class 4 computers and 7 percent in 1977. Thus this size class seems to show no major change in the Federal vs. U.S. computer trends. In recent years the number of both U.S. and Federal size class 4 computers has decreased slightly.

e. Size Class 5 Computers

Figure 38 shows the number of Federal and U.S. size class 5 computers. As was shown in figure 33, size class 5 computers seem to fall into a pattern with the larger size class 6 and 7 computers for both the Federal and U.S. computers. In 1972 the Federal Government had 328 size class 5 computers and had 364 in 1977 for an average compound growth rate of 2 percent. This number represented 5 percent of the total computers and 9 percent of the general purpose segment in 1972 and 3 percent of the total and 11 percent of the general purpose segment in 1977. The U.S. had 3,213 size class computers in 1972 and 4,674 in 1977 for an average growth rate of 8 percent. These represented 3 percent of the total U.S. computers and 6 percent of the general purpose segment in 1972 and approximately 1 percent of the total and 8 percent of the general purpose segment in 1977. Both the Federal and the U.S. size class 5 computers decreased by 2 percent of the total computers between 1972 and 1977 and increased by 2 percent for the general purpose segment during the same time period. Thus, even though the graph of the number of Federal size class 5 computers appears to be linear, the Federal and the U.S. size class 5 computers have increased by the same amount, i.e., 2 percent of each general purpose segment.

The Federal portion of the U.S. size class 5 installed base has decreased from 10 percent in 1972 to 8 percent in 1977. This means that on the whole the U.S. size class 5 computers is growing a little faster than the Federal size class 5 computers but not really significantly. Because both the Federal and the U.S. size class 5 computers are showing only a slight increase in number of computers this size class is considered relatively stable. With the data available we are unable to predict any significant changes

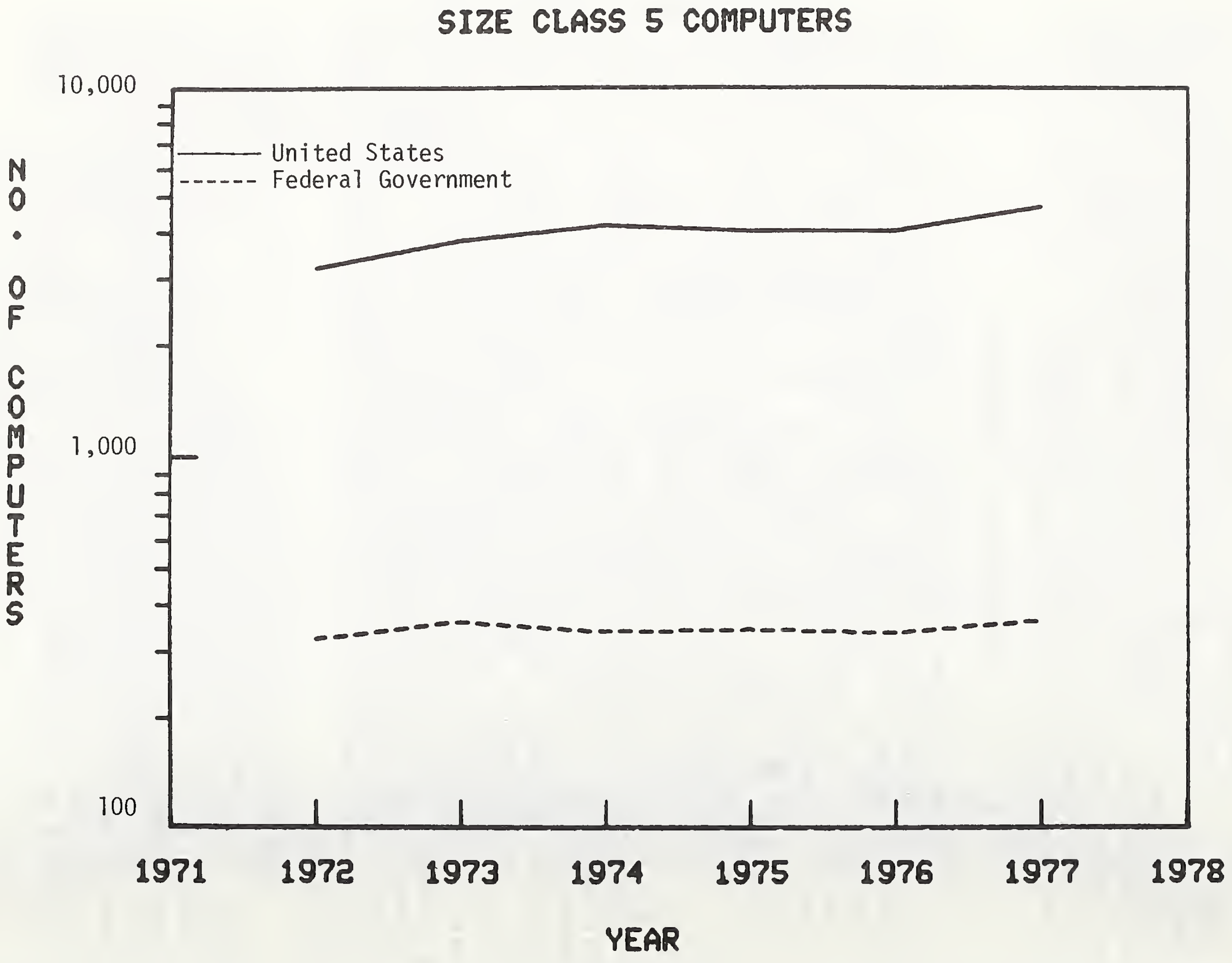

SIZE CLASS 5 COMPUTERS
United States
Federal Government
NO. OF COMPUTERS
10,000
1,000
100
1971
1972
1973
1974
1975
1976
1977
1978
YEAR

FIGURE 38

in this size class.

f. Size Class 6 Computers

Figure 39 shows the size class 6 Federal and U.S. computers. Even though these large-scale computers are small in numbers they represent a large dollar value, since the average monthly rental of this size class is between $45,000-$95,000 according to IDC. Both the Federal and U.S. numbers of computers in this size class are increasing. The Federal computers have grown from 308 in 1972 to 440 in 1977, for an average compound growth rate of 7 percent. This represents an increase of 5 percent of the general purpose segment. The Federal size class 6 computers represented 8 percent of the general purpose segment in 1972 and 13 percent in 1977. At the same time this number of computers represented 4 percent of the total Federal computers in both 1972 and 1977. Since all of the smaller size classes had decreased in their percent of the total computer population, the fact that this size class remained the same is significant. The smaller size classes seemed to reflect the overall decrease in the percent of general purpose computers compared with the total.

The U.S. size class 6 computers have increased from 2,209 computers in 1972 to 3,354 in 1977 for an average growth rate of 9 percent. This represents a 2 percent increase of the general purpose segment. In 1972 the U.S. size class 6 computers were 4 percent of the total general purpose segment and were 6 percent in 1977. At the same time they were 2 percent of the total U.S. computers in 1972 and 1 percent in 1977. Thus these computers do not show the same signs of growth in the general purpose segment as Federal computers show.

There is one other interesting statistic on the size class 6 computers. In 1972 the Federal size class 6 computers represented 14 percent of the U.S. size class 6 installed computers and in 1977 represented 13 percent of the U.S. Of all of the size classes this size class showed the smallest decrease in the Federal portion of the U.S. installed base. Thus this is the only Federal size class whose overall growth is almost keeping pace with the U.S. growth.

SIZE CLASS 6 COMPUTERS

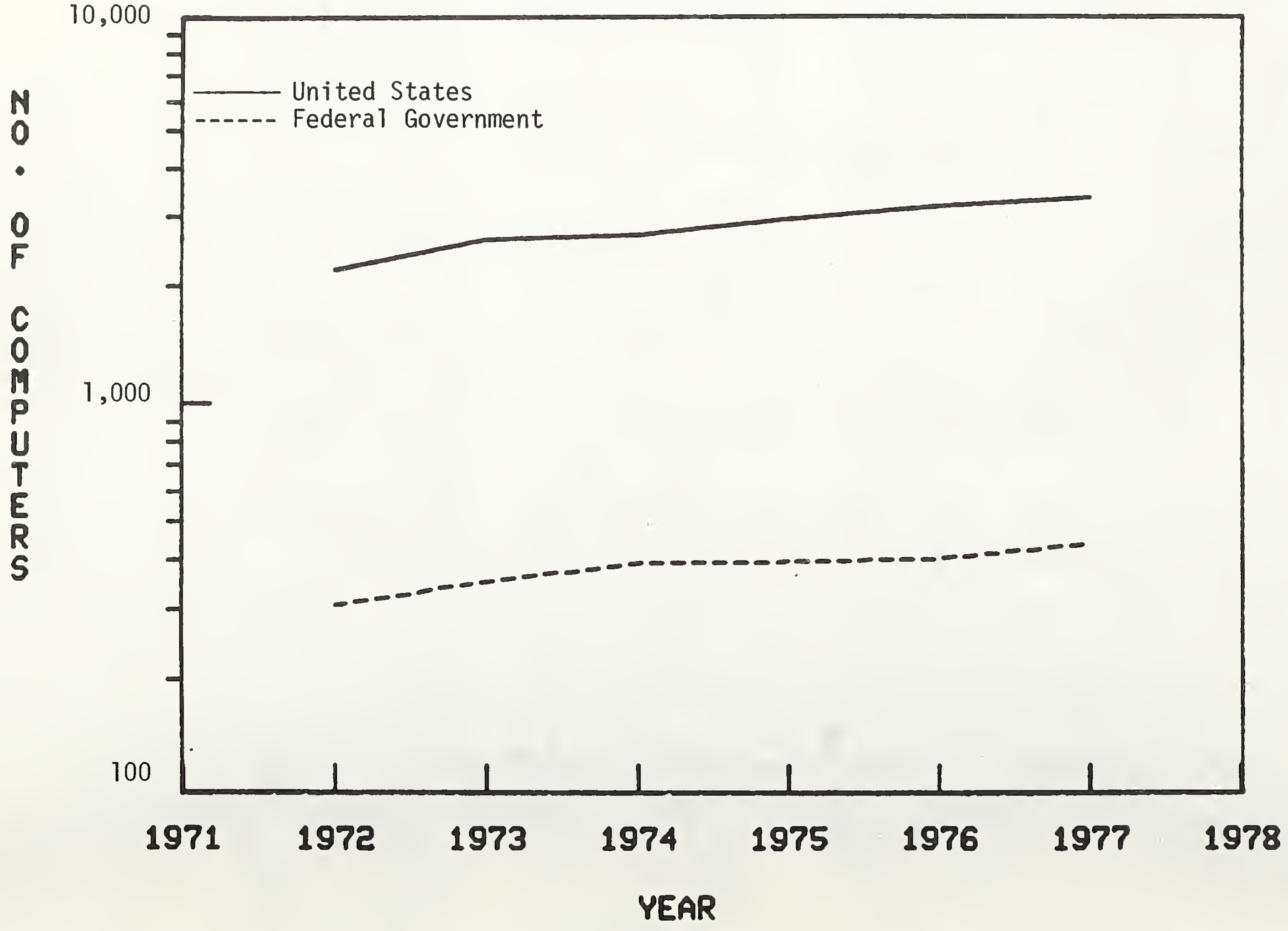


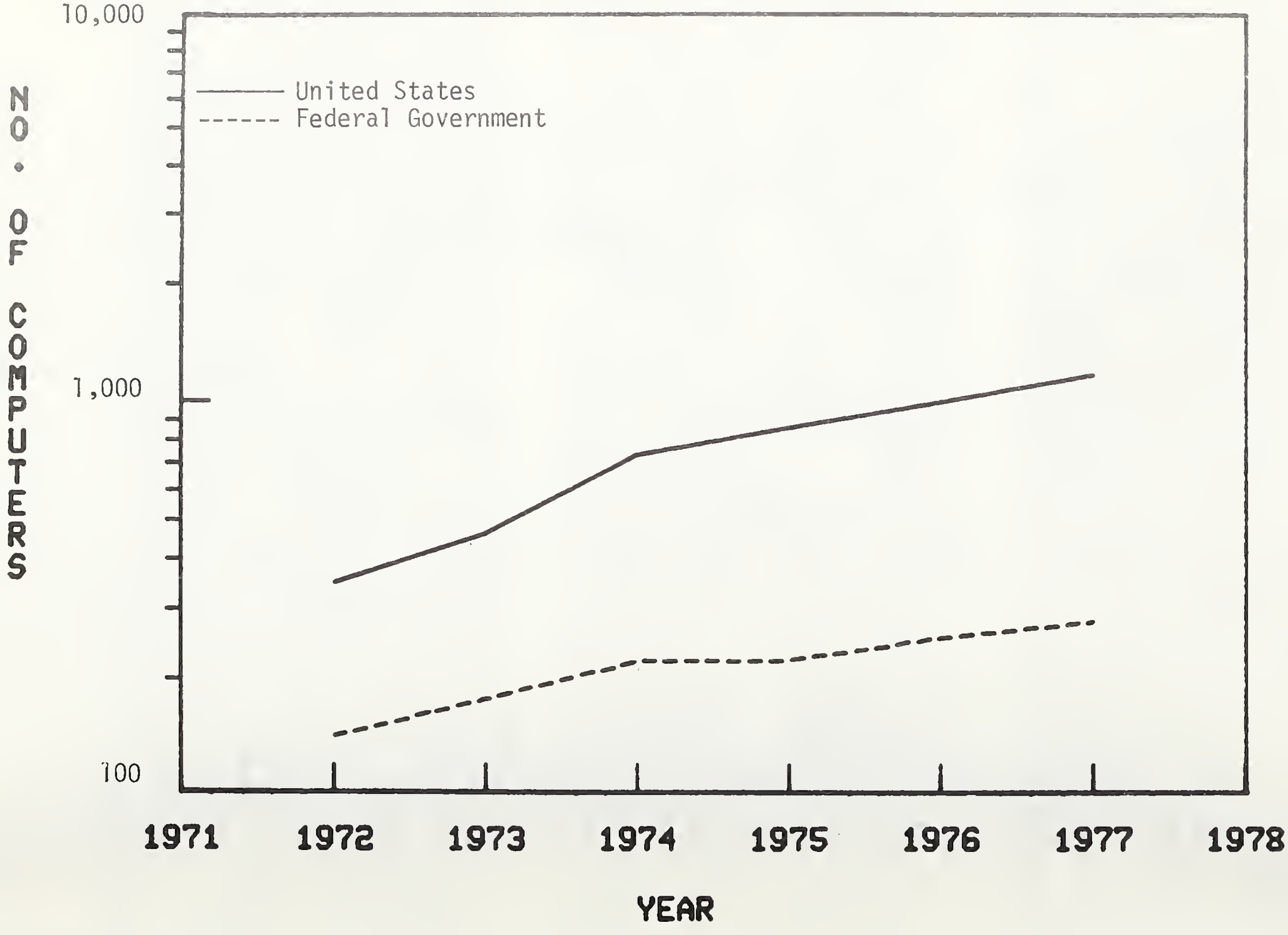
FIGURE 39

g. Size Class 7 Computers

Figure 40 shows the size class 7 computers for the Federal Government and the U.S. This size class includes the largest of the general purpose computers, machines which cost as much as $5M dollars. This is also the size class with the smallest number of computers. In 1972 the Federal Government had 141 size class 7 computers and had 277 in 1977, for an average compound growth rate of 15 percent. These numbers represent 4 percent of the Federal general purpose computers in 1972 and 8 percent in 1977. Compared with the total number of Federal computers, this size class represented 2 percent in 1972 and a little over 2 percent in 1977.

The U.S. had 351 size class 7 computers in 1972 and 1,178 in 1977 for an average compound growth rate of 28 percent. These numbers represent 1 percent of the general purpose computers in 1972 and 2 percent in 1977. When compared with the total U.S. computers, these size class 7 computers represent less than 1 percent of the total in both 1972 and 1977. The 2 percent of the U.S. general purpose segment that is the number of size class 7 computers represented over 19 percent of this segment by dollar value, according to IDC. This equalled a dollar value of over $8B with an average system value of almost $7M. If this average system value was applied to the Federal size class 7 computers, the approximate dollar value would be almost $2B. Thus the small number of these computers represents a large dollar value.

For these size class 7 computers the Federal Government represents a large portion of the U.S. installed base. In 1972 the Federal size class 7 computers represented over 40 percent of the U.S. size class 7 computers, and in 1977 represented almost 24 percent. The Federal Government represents the largest portion of the U.S. installed base for this size class when compared with the Federal portion of all of the other size classes. It is significant that it is the largest size class of computers that has the largest Federal portion of the U.S. installed base. It is also important to note that, as was shown in figure 34, these size class 7 computers are showing the largest growth rates of any of the size classes for both the Federal and U.S. computers. Thus, this size class should continue to grow in importance in the future.



SIZE CLASS 7 COMPUTERS

FIGURE 40

2. Special Computers

Figure 41 shows the special computers that are in the Federal Government and the U.S. Remember that these computers in the Federal Government include military systems or computers for special Government use, plus all of the computers which are neither general purpose nor minicomputers. In the U.S. these computers are also the computers that are not either minicomputer or general purpose, including small business machines, communication processors, data entry and process control computers. In 1972 the Federal Government represented 9 percent or 1,159 computers of the U.S. 12,430 special computers. In 1977 the Federal Government represented 3 percent, 1,728 computers, of the U.S. 51,122 special computers. Thus even though the Federal special computers increased they did not even double while the number of U.S. special computers more than quadrupled.

As was mentioned in Section VI. A., the Federal special computers have remained relatively constant over these years when compared with the total Federal computers. The special computers represented 17 percent of the Federal computers in 1972, 1973, 1974, 1975, and in 1977 represented 15 percent. At the same time the special U.S. computers represented 12 percent of the U.S. computers in 1972 and 16 percent in 1977. Thus the U.S. special computers when compared with the total U.S. computers are increasing, while the Federal special computers when compared with the total Federal computers are decreasing. This difference can be further explained by analyzing the growth rate for both Federal and U.S. special computers. Figure 42 shows the average compound growth rates for these computers. It is obvious from this figure that the U.S. average growth rate of 37 percent is far greater than the Federal growth rate of 8 percent. This explains why the portion of Federal special computers in the U.S. installed base is diminishing. One of the reasons for this may be the increase of small business machines in the U.S. special category. When the Federal computers were searched model by model, there were very few small business machines listed. Thus, the category of special computers in the Federal Government will probably remain stable while the U.S. special computers will contine to increase.

SPECIAL COMPUTERS

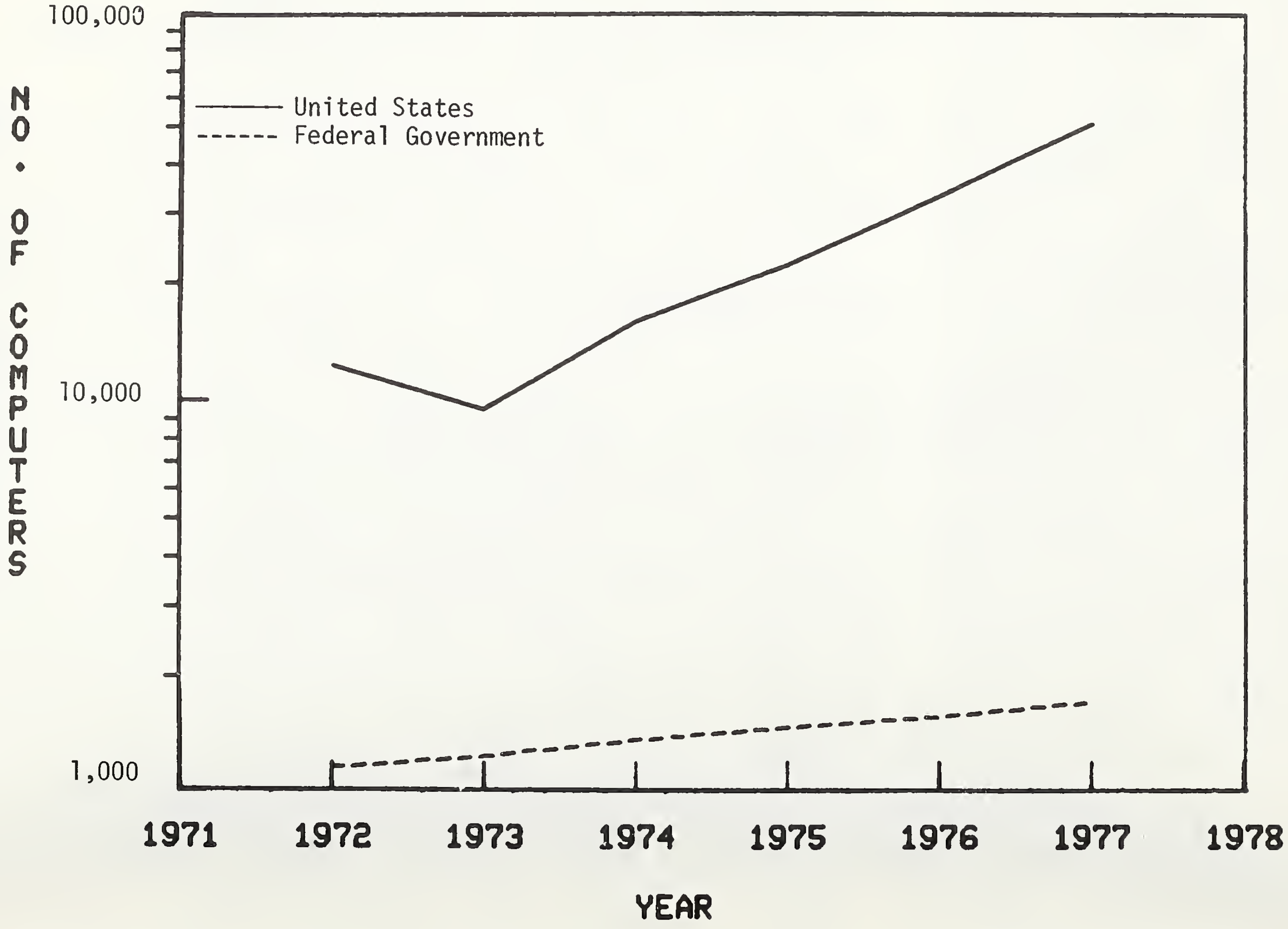


FIGURE 41

GROWTH RATE OF SPECIAL COMPUTERS

	U.S.			Federal		
Fiscal Year	Total # of CPUs	# CPUs added per year	Growth Rate (%)	Total # of CPUs	# CPUs added per year	Growth Rate (%)
1972	12,430			1,159		
		2,880	-23%		68	6%
1973	9,550			1,227		
		6,400	67%		137	11%
1974	15,950			1,364		
		6,253	39%		118	9%
1975	22,203			1,482		
		11,132	50%		105	7%
1976	33,335			1,587		
		17,785	53%		141	9%
1977	51,122			1,728		
		88,904	37.2%		113.8	8.4%

Figure 42

3. Minicomputers

As has been shown in Figures 24,25, and 26 for the Federal Government and Figures 28, 29, and 30 for the U.S., minicomputers now represent the largest segment of both of the installed bases. In 1977 minicomputers represented 55 percent of the Federal computers and 66 percent of the U.S. It was also obvious in Figures 26 and 30 that the growth curve for minicomputers in both the Federal Government and the U.S. was greater than that for either the general purpose computer segment or the special computers. Figure 43 shows the curve of the U.S. and Federal minicomputers. The number of both Federal and U.S. minicomputers are increasing but this figure shows that the U.S. numbers appear to be increasing much more dramatically. In 1972 the Federal portion of U.S. minicomputers was a little over 4 percent. In 1977 the Federal portion equalled less than 3 percent of the U.S. installed minicomputers. This, however, is not that great a change. Figure 44 shows that the average compound growth rate for minicomputers in the U.S. is 39 percent and 27 percent for the Federal Government. The 27 percent is the largest growth rate of any segment of the Federal computers. The growth rate of 39 percent is the largest growth rate of any of the segments of the U.S. computer systems. Thus when both the U.S. and the Federal minicomputers are analyzed by growth rate based on number of computers, minicomputers by far show the largest growth. The U.S. minicomputers are growing at a faster rate than the Federal computers, but in recent years the difference in the growth rates has grown smaller. The Federal minicomputers will probably follow the average growth rate of 27 percent and approach 10,000 computers by the year-end 1979. The U.S. minicomputers will probably not follow the average growth rate of 39 percent but will approach a growth of closer to 34 percent or approximately 387,000 computers by year end 1979. This means that the portion of Federal minicomputers in the U.S. installed base will still be between 2.5 percent and 3 percent.

D. Analysis of the Dollar Value of U.S. General Purpose Computers by SIC Code

There is no direct method to compare the uses of computers in the Federal Government to the uses of the U.S. computer population. However, it is interesting to see what trends or growth areas are appearing in the uses of the U.S.

MINI COMPUTERS

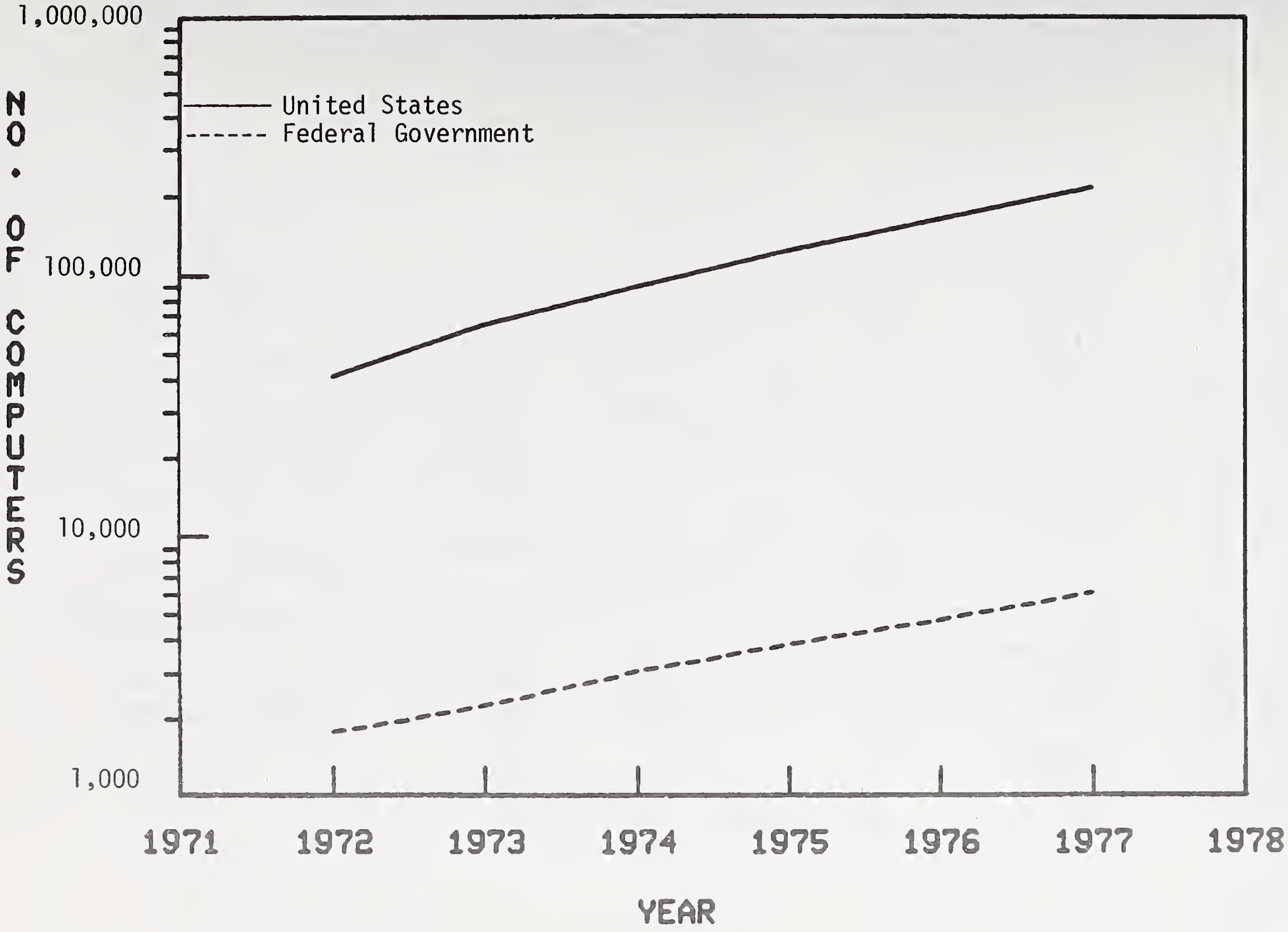


FIGURE 43

GROWTH RATE OF MINICOMPUTERS

	U.S.			Federal		
Fiscal Year	Total # of CPUs	# CPUs added per year	Growth Rate (%)	Total # of CPUs	# CPUs added per year	Growth Rate (%)
1972	41,370			1,804		
		24,030	58%		452	25%
1973	65,400			2,256		
		24,300	37%		794	35%
1974	89,700			3,050		
		33,100	37%		798	26%
1975	122,800			3,848		
		39,900	32%		942	24%
1976	162,700			4,791		
		53,100	33%		1,305	27%
1977	215,800			6,096		
			39%			27%

Figure 44

computers. Since there is a SIC code (Standard Industrial Classification) for Federal Government and State and Local Governments, data is available to relate these two SIC codes to the rest of the codes. International Data Corporation (IDC) provided data for the U.S. installed dollar value of general purpose computers by SIC code for 1973-1977. This data came from a number of IDC sources including several special reports that are provided through their Corporate Planning Service.

The compilation of this five years of data is presented in figure 45. The dollar value of computers in the SIC code for the Federal Government is shown to have decreased from 10.8 percent of the total in 1973 to 6.7 percent in 1977. These numbers should not be compared with the figures in earlier sections since the IDC analysis of Federal data is different from ours. IDC in the past has looked at the GSA general management category of computers and considered about 70 percent of these to be general purpose. Thus the IDC figures for the Federal Government are generally lower than those in the earlier sections of this report.

The data for 1973 and 1977 from figure 45 is presented in graphic form in figure 46. The 1973 figures are presented as dotted lines and the 1977 data as solid lines. Some bars appear only as solid lines because the 1973 and 1977 figure are the same, that is, that no change occurred. According to figure 45 and also the graphic representation of the data in figure 46 the SIC codes showing the largest increase from 1973 to 1977 are business and miscellaneous services with an increase of 2.8 percent, State and Local Government with an increase of .9 percent, insurance with an increase of .9 percent, and wholesale trade with an increase of .8 percent. The business and miscellaneous services SIC code includes the following categories: advertising, consumer credit reporting agencies, mailing, reproduction, commercial art and photography services, accounting, auditing and bookkeeping services, noncommercial educational, scientific and research organizations, engineering services, and computer and data processing services. Although data is not available, the large increase in the dollar value of this SIC code may be due to the increase in computers in computer and data processing services, accounting services, and the consumer credit reporting services. All of these services are now utilizing computers to a large extent.

U.S. INSTALLED BASE DOLLAR VALUE BY INDUSTRY - General Purpose Computers

S.I.C.	Description	% of Total				
		1973	1974	1975	1976	1977
13	Crude Petroleum Mfg.	1.1	1.0	1.0	1.0	1.2
01-12,14-17	Mining & Construction	1.0	1.0	1.0	.9	.9
20	Food Products Mfg.	1.5	1.7	1.7	1.7	1.6
27	Printing & Publishing	1.6	1.8	1.7	1.8	1.6
28	Chemical Mfg.	2.2	2.0	2.1	2.2	2.2
21-6,29	Other Nondurable Mfg.	3.2	3.4	3.2	3.3	2.9
33	Primary Metals Mfg.	1.5	1.4	1.4	1.4	1.3
35	Non-Electrical Machinery Mfg.	4.0	3.9	3.9	3.8	3.6
36	Electrical Machinery Mfg.	4.1	3.9	3.6	3.5	3.3
37	Transportation Equipment Mfg.	4.0	3.7	3.3	3.0	3.3
19,30-2,34,38,39	Other Durable Mfg.	4.1	4.2	4.2	4.3	4.5
40-47	Transportation Carriers	3.3	3.3	3.3	3.3	3.3
48	Communications	2.8	3.0	2.9	3.1	3.2
49	Electric & Gas	2.3	2.1	2.0	2.0	2.2
50,51	Wholesale	3.9	4.4	4.4	4.6	4.7
52-59	Retail	2.8	3.0	3.1	3.2	3.1
60	Banking	7.6	7.5	7.6	7.5	7.8
63	Insurance	6.1	5.9	6.4	6.7	7.0
61,62,64-67	Other Financial	4.2	3.7	3.6	3.7	3.7
73,89	Business & Misc. Services	13.6	14.7	15.6	16.1	16.4
80	Med. & Health Services	1.6	1.7	1.7	1.8	1.8
82	Education	6.1	5.9	6.4	6.1	5.9
70,72,75-9,81,83-6	Other Services	1.0	1.1	1.3	1.3	1.3
91	Federal Government	10.8	9.9	8.7	7.2	6.7
92,93	State & Local Government	5.6	5.8	5.9	6.5	6.5

Figure 45

U.S. GENERAL PURPOSE COMPUTER DOLLAR VALUE BY INDUSTRY

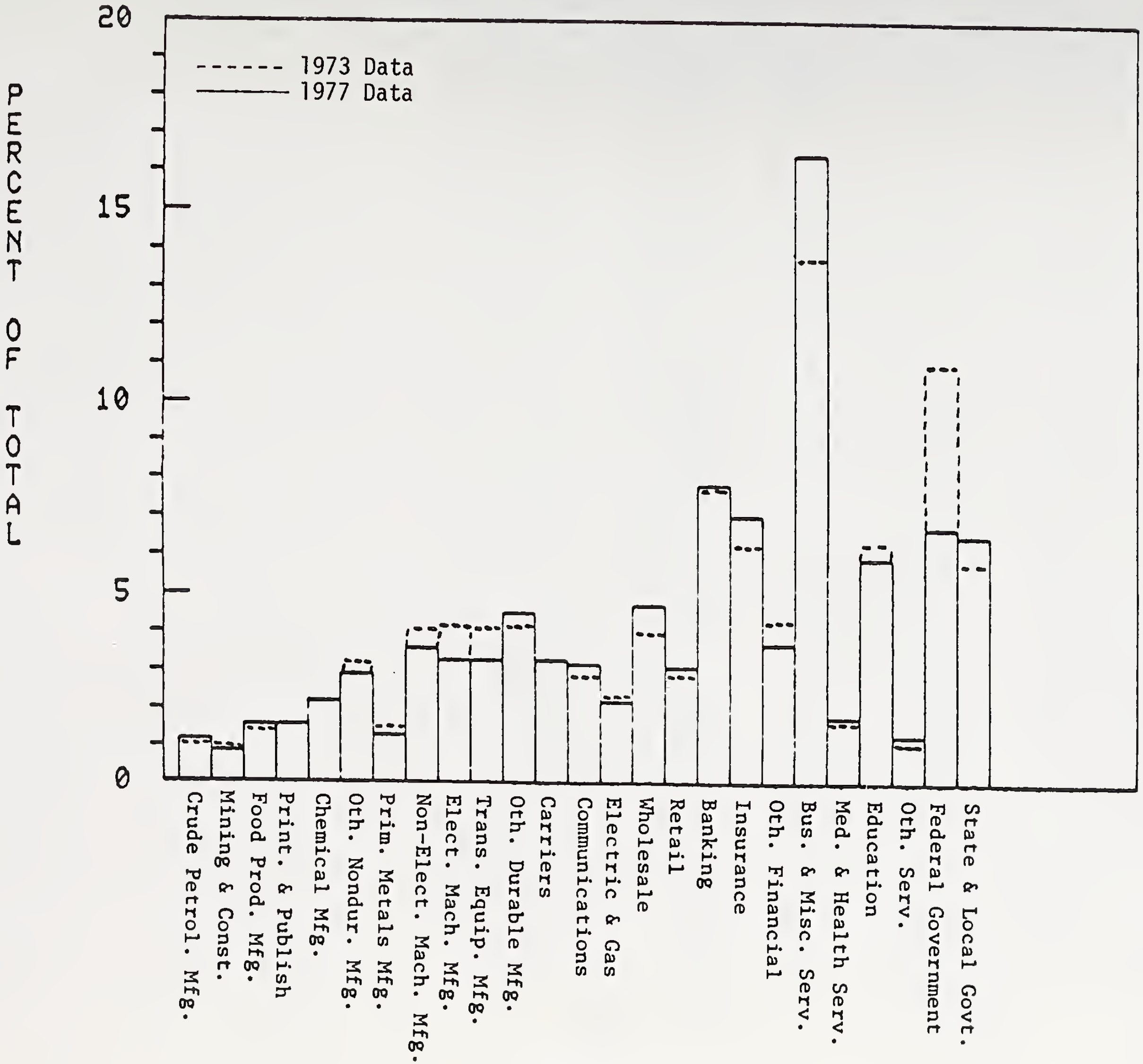


Figure 46

The largest decreases shown in figures 45 and 46 are the SIC codes for the Federal Government, with a decrease of 4.1 percent, electrical machines manufacturing with a decrease of .8 percent, and transportation equipment manufactures with a decrease of .7 percent. These decreases do not immply that the total dollar value of the Federal Government or the other codes has declined but simply that the rest of the general purpose computer dollar values have increased more than these codes. Thus this data simply shows that the dollar value of Federal general purpose computers is not increasing as much as the dollar values in other industrial sectors.

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Martha Mulford Gray

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☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

This report presents data on the status of computer technology in the Federal Government. It is an extension and update of "Computers in the Federal Government: A Compilation of Statistics" (NBS SP 500-7), June 1977. The report contains a combination of existing statistics based on these sources. Data is included on numbers of computers installed in the Federal Government, dollar value of computers installed, numbers of computers installed by agency, Federal ADP costs by agency, Federal computers by acquisition date, and Federal ADP work-years. A detailed analysis is presented for Federal computers classifying the computers into three major categories, general purpose computers, special computers and minicomputers. Federal computers are compared with U.S. computers in the same categories.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Federal Government computers; statistics; ADP costs; Federal minicomputers; Federal ADP statistics; Federal acquisition dates; Federal ADP work-years.

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